

THE

FEB 13 1929

ARCHITECTURAL FORUM

IN TWO PARTS



PART ONE

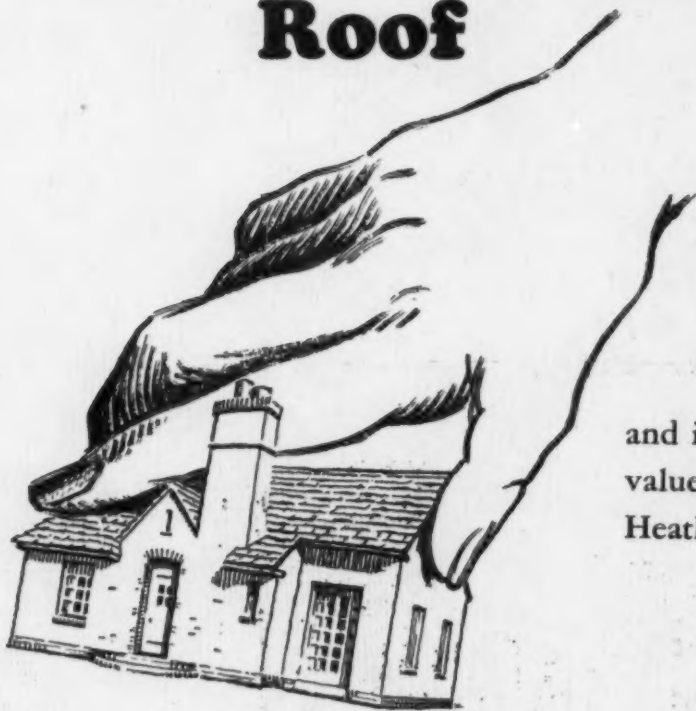
ARCHITECTURAL DESIGN

FEBRUARY

1929



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THE PAN-HELLENIC BUILDING, NEW YORK

JOHN MEAD HOWELLS, ARCHITECT

From a Water Color Sketch by George B. Coombe

The Architectural Forum



THE ARCHITECTURAL FORUM

VOLUME L

FEBRUARY, 1929

NUMBER TWO

✓ TWO CORNISH FISHING VILLAGES

BY

R. RANDAL PHILLIPS

AS one leaves Hampshire and Wiltshire behind and reaches the rich, rolling land of Devon, one becomes conscious of a distinct change, alike in the landscape and the houses. This is the beginning of the West Country. There is a peculiar charm about it, and a varying interest. The villages of Devonshire, with their old whitewashed walls and thatched roofs, racy of the soil, are part of a mellow setting marked by luxuriant woodland and cultivated fields. In Cornwall the scene changes. This is a country of rugged outline, bleaker in aspect, yet possessing an individual attraction, a land of rocks and minerals, with but a sparse covering of soil to give that richness of landscape which distinguishes other counties of southern England. It is the coast line in Cornwall that lures the eye. Ensnconed in coves and little harbors is many a delightful fishing village. Among them are Polperro and Cadgwith, the former about 20 miles west of Plymouth, the latter about the same distance west of Falmouth, and only a few miles from the "Lizard," which is the southernmost point of England. Both are off the beaten track, and until the last few years,—since the coming of the inexpensive car,—were practically unknown to the outer world. Thus they have preserved themselves intact, living descendants of centuries ago,—fishing villages of simple character, possessing the charm inherent in simple things.

They are remarkably similar in their general aspect, for each is situated at the foot of a narrow valley, with high rocky coast hemming in the seaward entrance, and in each is a spur that juts out at the center, giving protection to the harbor in the case of Polperro, and to the cove in the case of Cadgwith. Polperro has the more rugged setting, and its charm is of a rather austere kind; Cadgwith is softer in its appeal, and the comparison is borne out by the houses no less than by the setting in each case. In Polperro we find all the houses built of local stone, and roofed with either this or with slates covered with a "slurry" of thin cement, which gives to the whole aspect of the village a grayish tone. Cadgwith, on the other hand, reminds one of Devonshire, for its old

houses are built either of stone or cob (or a mixture of the two) and roofed with thatch, the wall faces being either whitewashed or ocher-colored.

Both of these two old fishing villages have one dominant characteristic,—a haphazard grouping of the houses, and their placing primarily to secure coziness and comfort. The idea of "building for the view," on high ground where all the inclemencies of the weather are suffered as a penalty for the fine prospect that may be enjoyed, is quite modern. The old people never did this sort of thing. The churches were the only buildings that were set high and exposed, and this was done in large measure because the church towers served as landmarks. The people put their houses in sheltered places, and so it is that at Polperro and Cadgwith the old houses huddle together in the bosom of the valley, where they get the utmost shelter from wind and rain. At Cadgwith, too, this main endeavor is further illustrated by their placing in regard to aspect. The cove faces southeast, and all the houses are set end-on to the cove. If Cadgwith were a modern place, of course the houses would be turned so that their fronts looked seaward. But the old people who built these houses,—probably two or three hundred years ago,—believed that it was better to have the blank gable ends as buffers to bad weather. This deliberate choice, and the making of their rooms with small windows set in very thick walls, resulted in less sunlight and air inside the houses than we should consider essential today, but to people who spent the greater part of their waking hours in the open air it was obviously a small matter in comparison with the conditions that prevail, say, in a working class urban population of our own time, with men and women engaged in indoor work.

These Cornish houses are almost invariably single-room deep. On the ground floor there are generally two rooms separated by a passage that leads in from the entrance door, with the staircase at the end of the passage, giving access to two or three bedrooms on the next floor. The rooms are rather low (about 7 feet high) and are beamed across, with the beams left exposed. One



FISHERMEN'S COTTAGES, POLPERRO



THE BROOK, POLPERRO



A NARROW, WINDING STREET, POLPERRO



A WAY UP TO THE CLIFF WALK, POLPERRO



OLD HOUSES OF EAST CLIFF, POLPERRO



A TURNING OFF THE MAIN STREET, POLPERRO



A COTTAGE DOORWAY, CADGWITH



OLD THATCHED ROOFS, CADGWITH



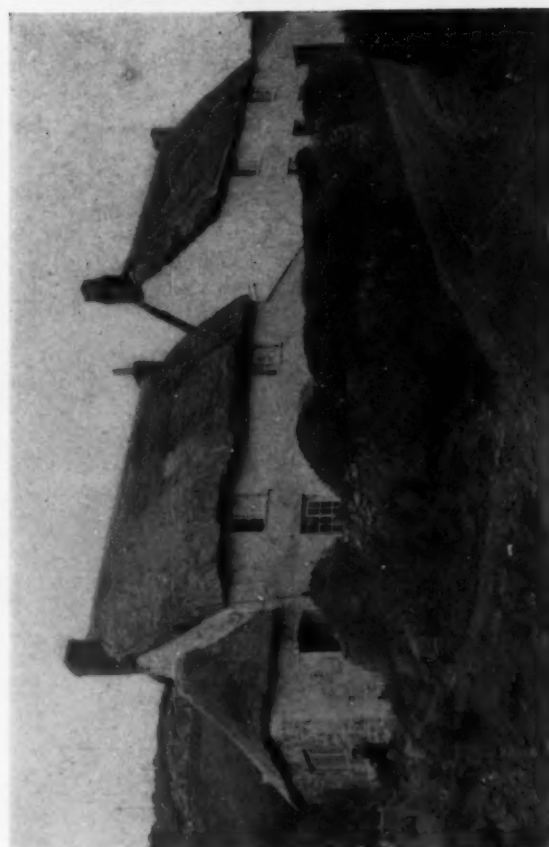
FROM THE WEST CLIFF, POLPERRO



END OF THE HARBOR, POLPERRO



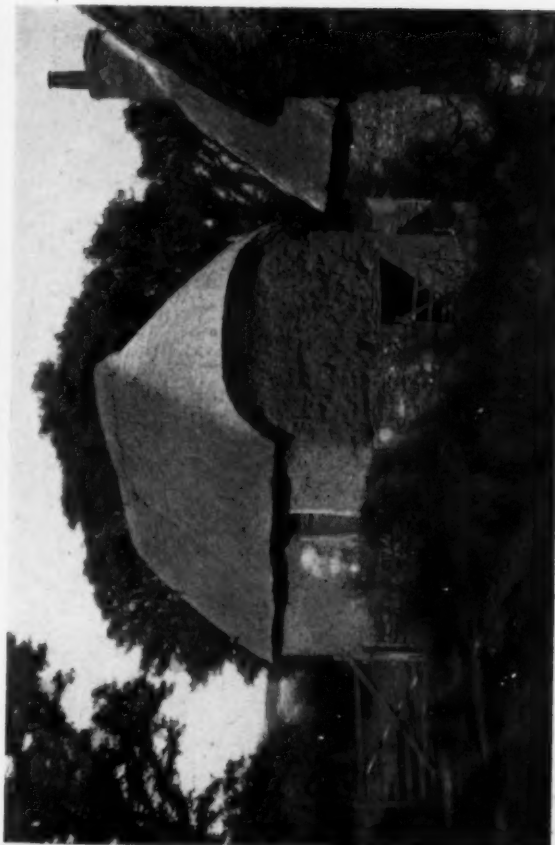
THE HARBOR, POLPERRO



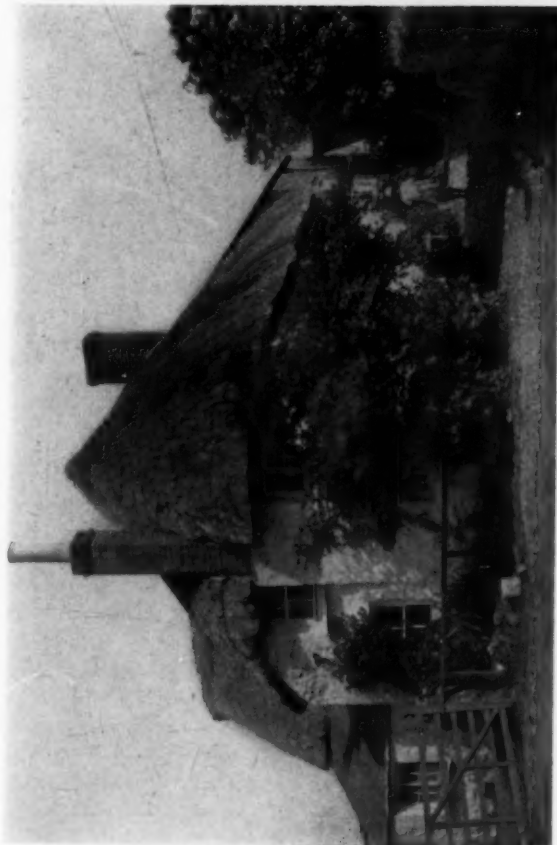
FISHERMEN'S COTTAGES, CADGWITH



OLD COTTAGE, CADGWITH



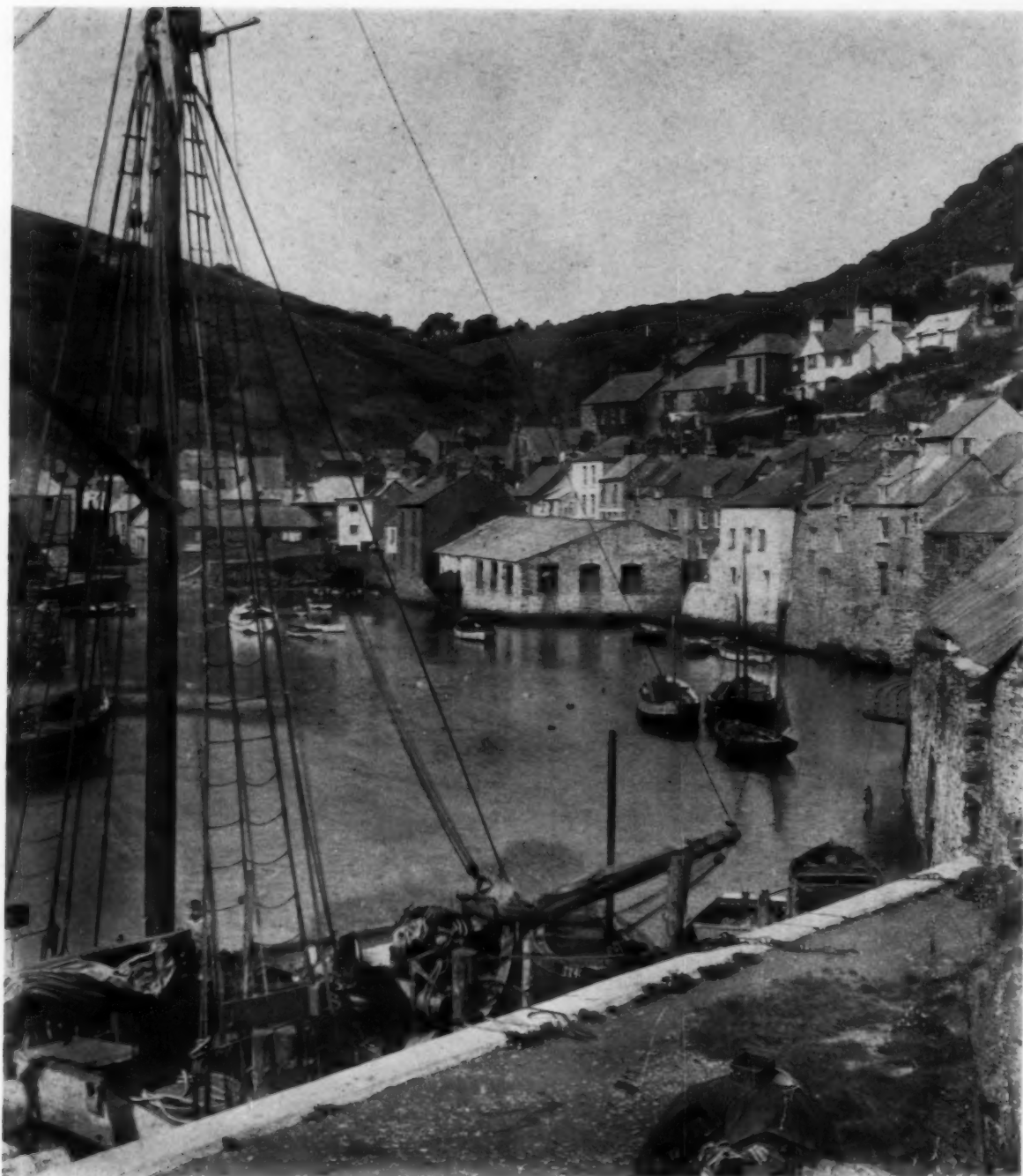
OLD BARN AT ST. ANTHONY



AT RUAN MINOR, CADGWITH



AT RUAN MINOR, CADGWITH



The Harbor, Polperro

of the two ground floor rooms is the common living room-kitchen, the other being a sort of parlor. It is very rarely that one finds the fireplaces in their original condition, for newer methods of cooking have spread to these out-of-the-way places, just as they have affected urban houses. The old fireplaces were of the familiar open kind, with wood fires burning on the hearths, and very ample chimney flues going straight up to the tops of the stacks. The old openings have in later days been filled in, and the common fitment is a West

Country range, consisting of a high-set fire with a removable ashpan below it and an oven on the right. The range is bedecked with brass knobs and rails, and the housewives take particular pride in keeping these bright and shining. Incidentally it may be mentioned that the range is amply efficient. There is, of course, no such thing as hot-water supply, but the fisher folk seem to get on quite well without it; indeed the common practice is for domestic ablutions to be carried out in a pail on the garden wall! This custom still obtains.



Street Leading Up From Harbor, Polperro

Pilchards used to provide the great catch for Cornish fisher folk, but in recent years, due probably to the operation of steam trawlers, the fish have gone away from many places. In former days the catching and salting of pilchards formed quite an extensive industry, and in many old houses, especially those at Polperro, we find underground places where the salting was carried out. Another feature of some houses is the provision of an outside staircase,—an inconvenient arrangement to modern eyes, but one which enabled the utmost use to be made of the small space

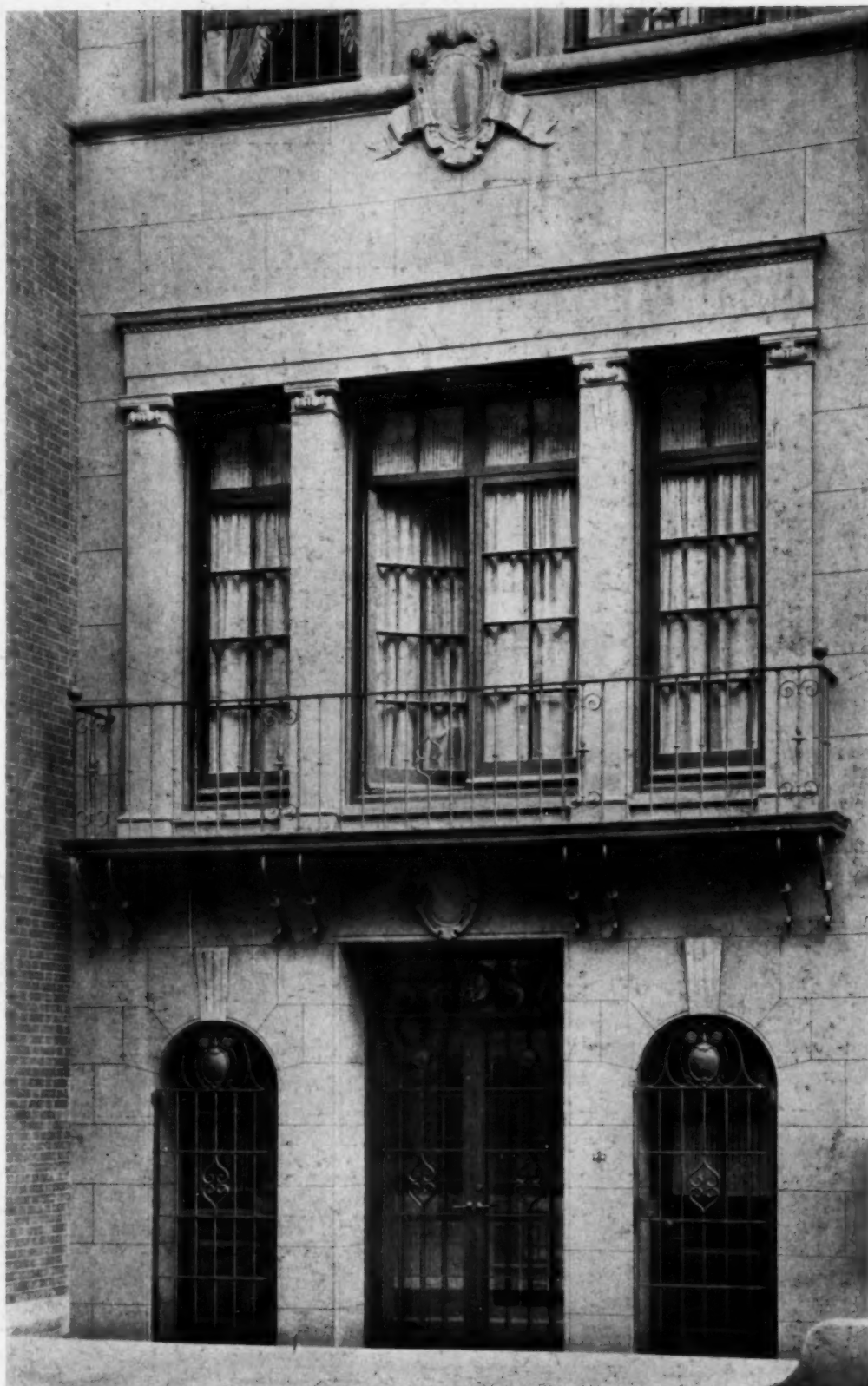
enclosed by the cottage walls. The latter are roughly built, often with large blocks in random courses, and the time-honored practice is to give the whole face of the house a wash of lime. Occasionally we see all the jointing lines picked out with a dark mortar or paint, but this is only one more instance where a bad modern practice has followed the decline of tradition in house building. As regards the windows, these originally were latticed, but very few old lattices have survived. In their places are often seen windows consisting of two sashes,—one fixed, one sliding.



OLD COASTGUARD COTTAGES AT ST. ANTHONY



OLD HOUSES BY THE HARBOR, POLPERRO



Photo, Sigurd Fischer

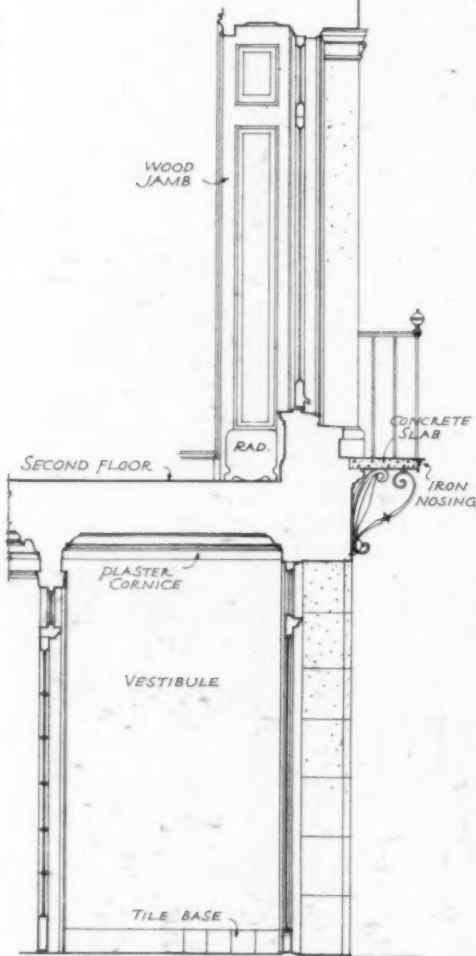
Details on Back

HOUSE OF ROSCOE H. HUPPER, ESQ., NEW YORK
GREVILLE RICKARD, ARCHITECT

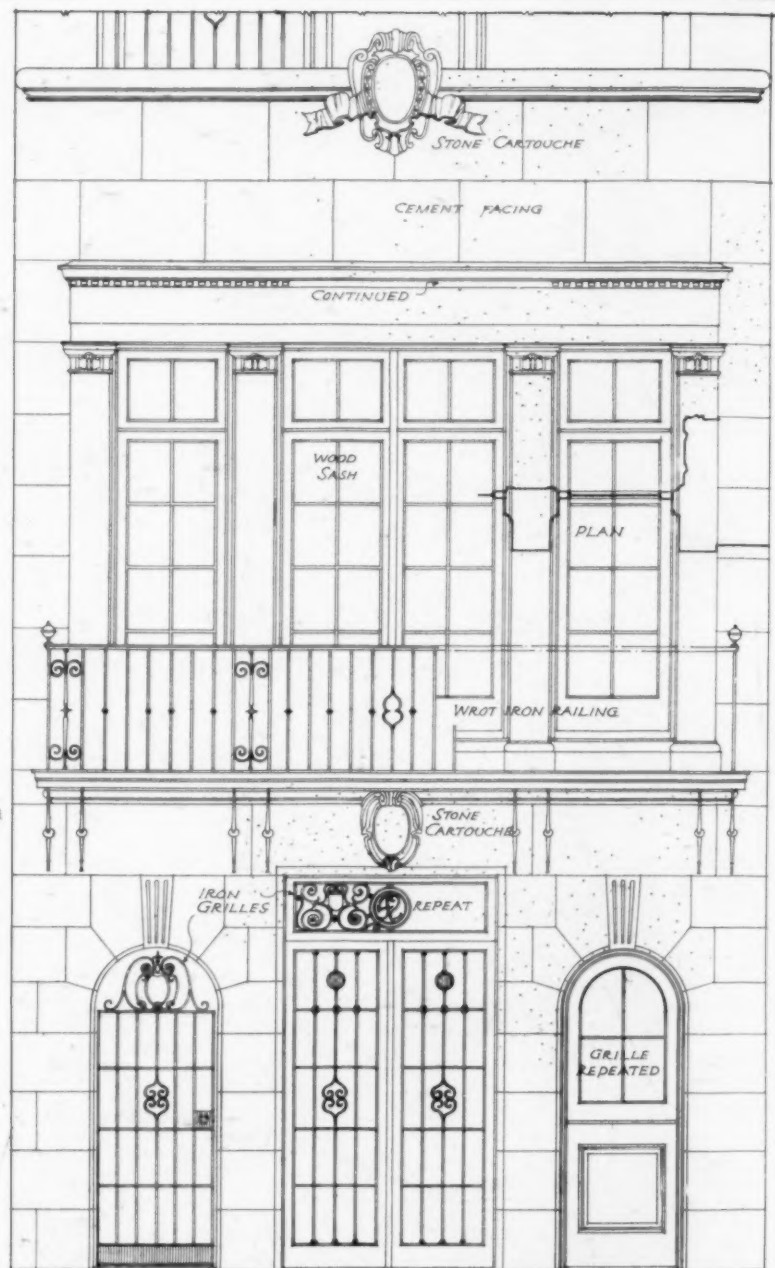
DETAIL of ENTRANCE

ALTERATIONS TO
R. H. HUPPER RESIDENCE
NEW YORK CITY

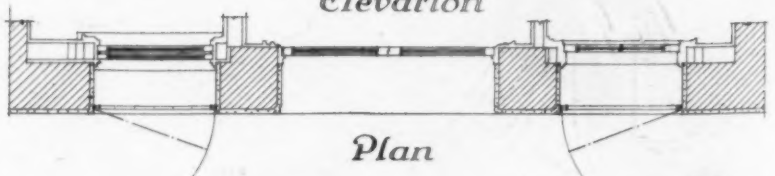
GREVILLE RICKARD ARCHT
NEW YORK CITY



Section



Elevation



Plan

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SCALE IN FEET

No.
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The ARCHITECTURAL FORUM DETAILS

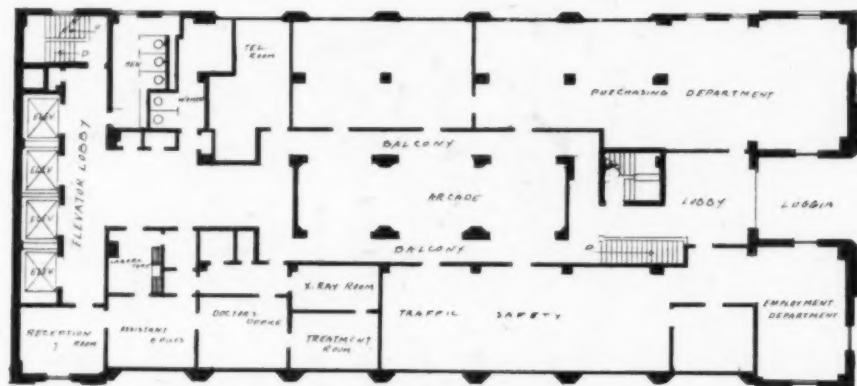


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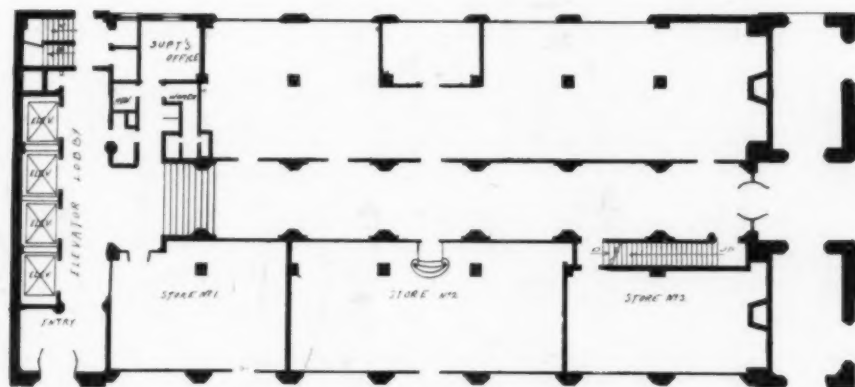
Plans on Back

ALABAMA POWER CO. BUILDING, BIRMINGHAM
WARREN, KNIGHT & DAVIS, ARCHITECTS



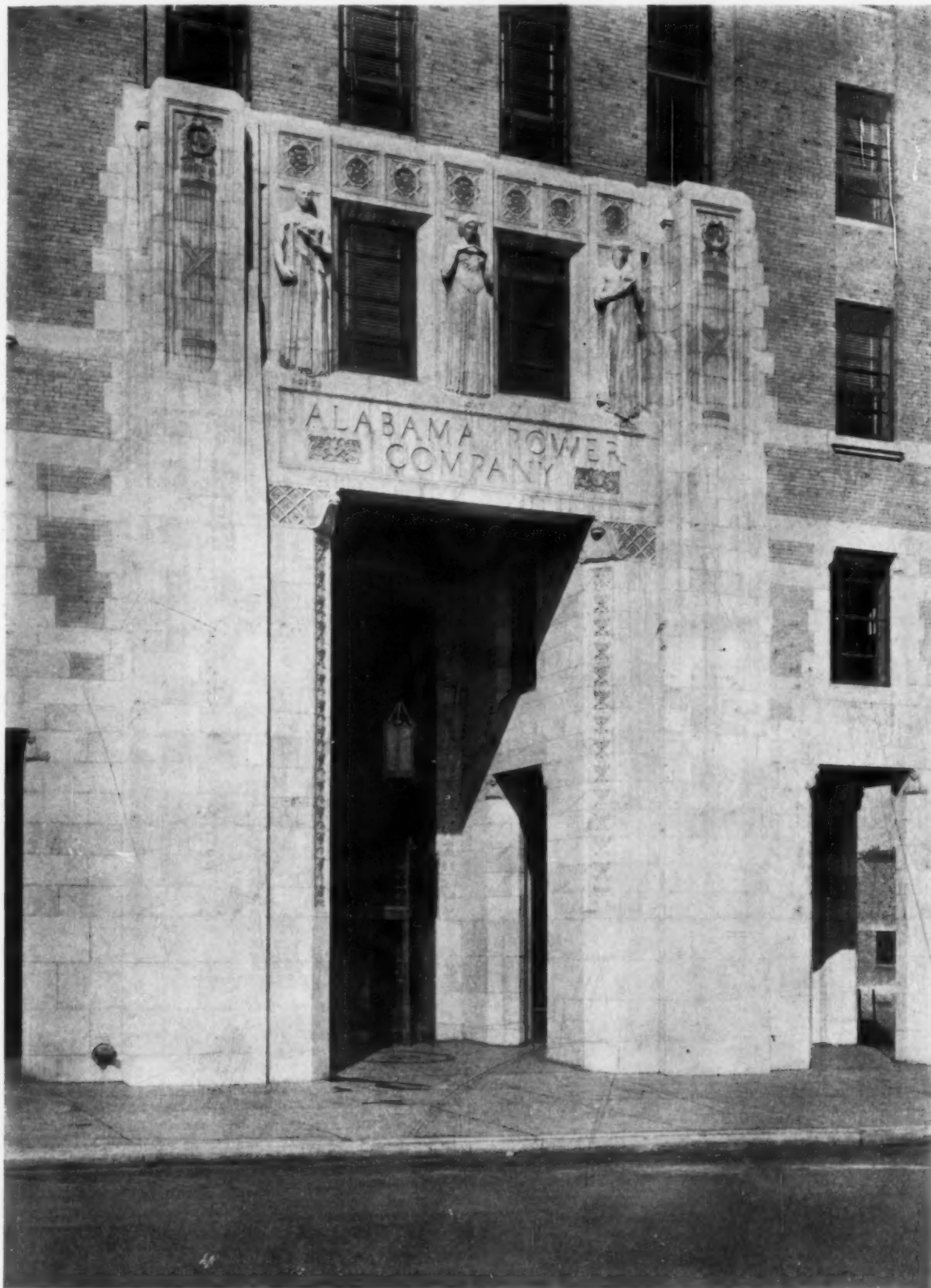


SECOND FLOOR



FIRST FLOOR

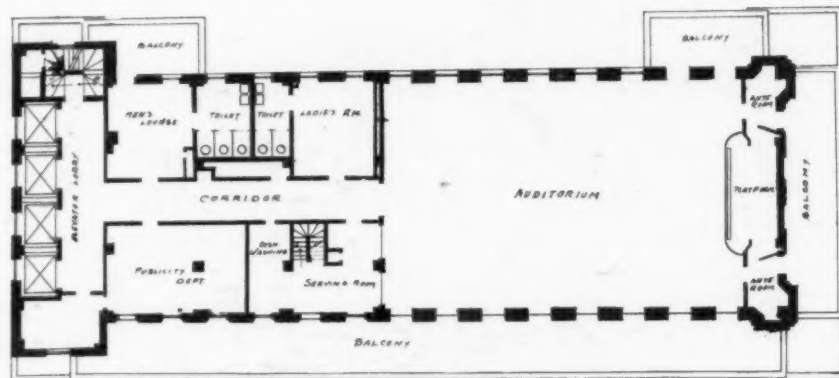
PLANS: ALABAMA POWER CO. BUILDING, BIRMINGHAM
WARREN, KNIGHT & DAVIS, ARCHITECTS



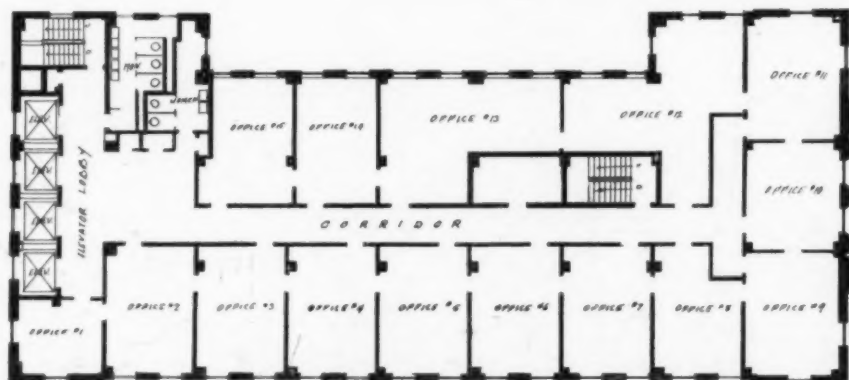
Plans on Back

ALABAMA POWER CO. BUILDING, BIRMINGHAM
WARREN, KNIGHT & DAVIS, ARCHITECTS





TOP FLOOR



A TYPICAL FLOOR

PLANS: ALABAMA POWER CO. BUILDING, BIRMINGHAM
WARREN, KNIGHT & DAVIS, ARCHITECTS



FRONT ELEVATION

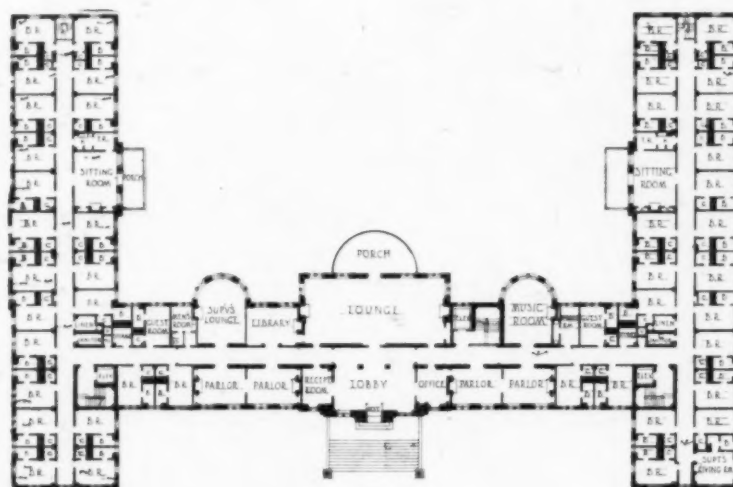


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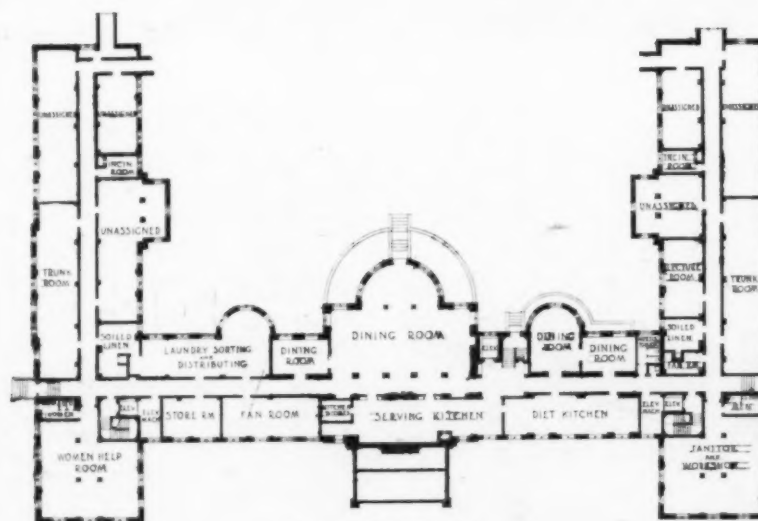
Plans on Back

GENERAL VIEW
CLARA FORD NURSES' HOME, DETROIT
ALBERT KAHN, INC., ARCHITECTS





FIRST FLOOR

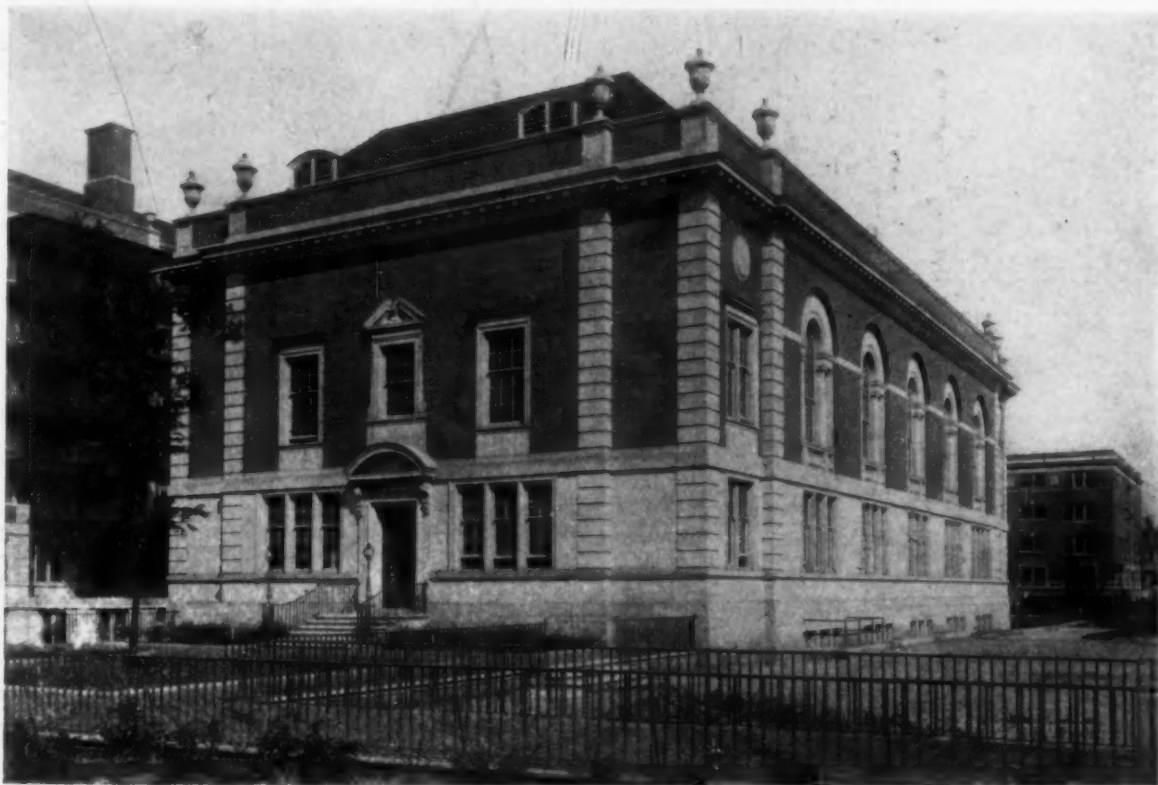


BASEMENT FLOOR

PLANS: HENRY FORD NURSES' HOME, DETROIT
ALBERT KAHN, INC., ARCHITECTS



FRONT ELEVATION



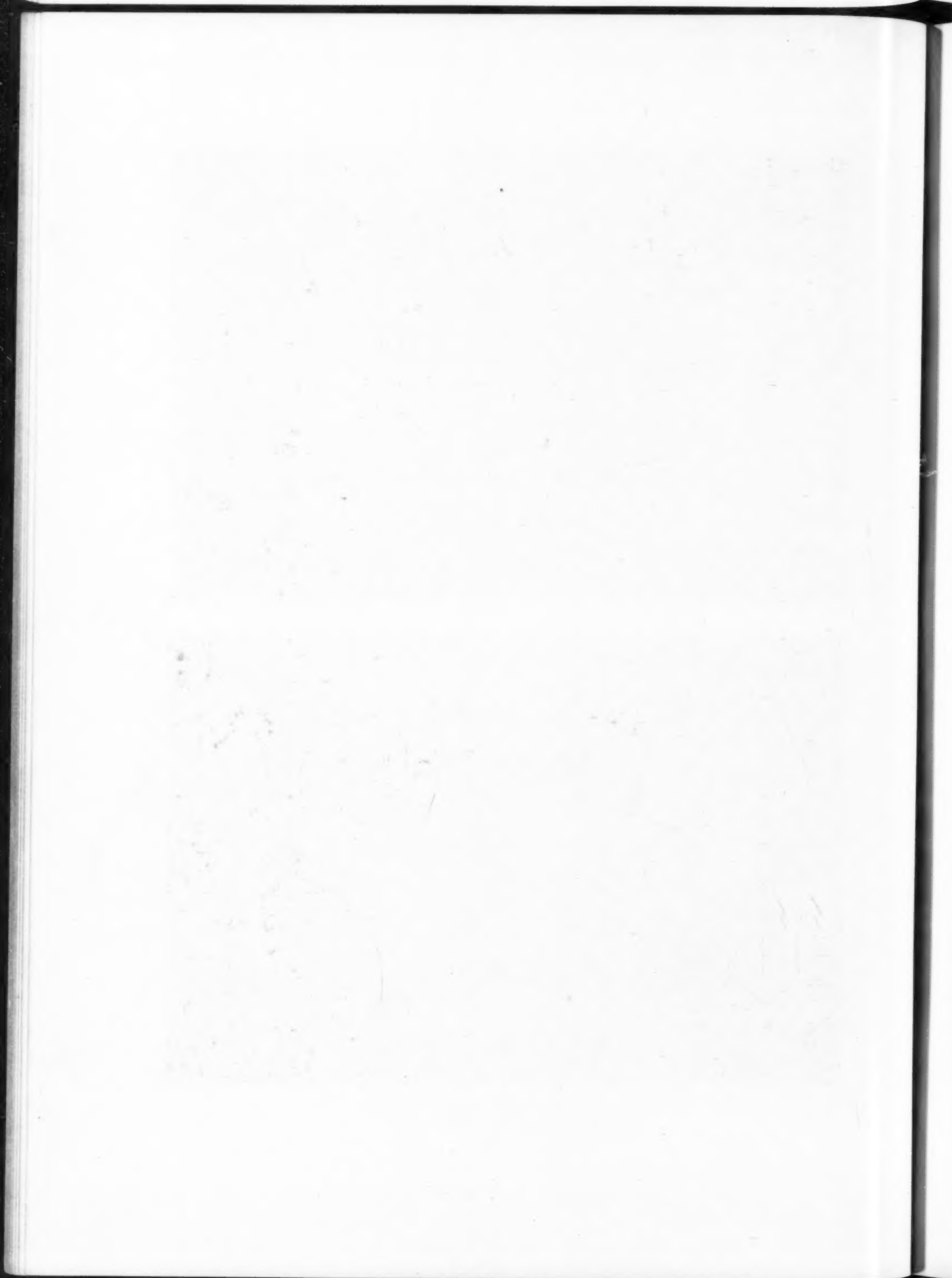
TRAINING SCHOOL
CLARA FORD NURSES' HOME, DETROIT
ALBERT KAHN, INC., ARCHITECTS



MAIN LOUNGE ROOM



SUPERVISOR'S LOUNGE
CLARA FORD NURSES' HOME, DETROIT
ALBERT KAHN, INC., ARCHITECTS



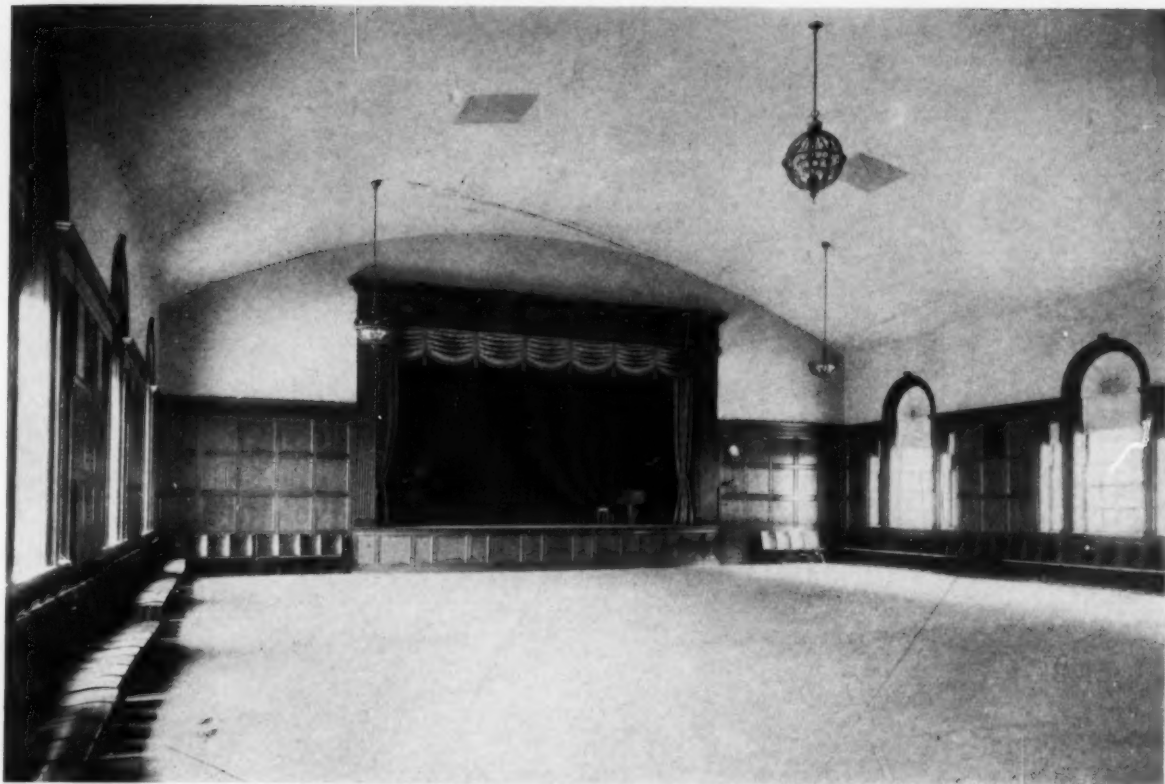


SMALL PARLOR



SMALL RECEPTION ROOM
CLARA FORD NURSES' HOME, DETROIT
ALBERT KAHN, INC., ARCHITECTS

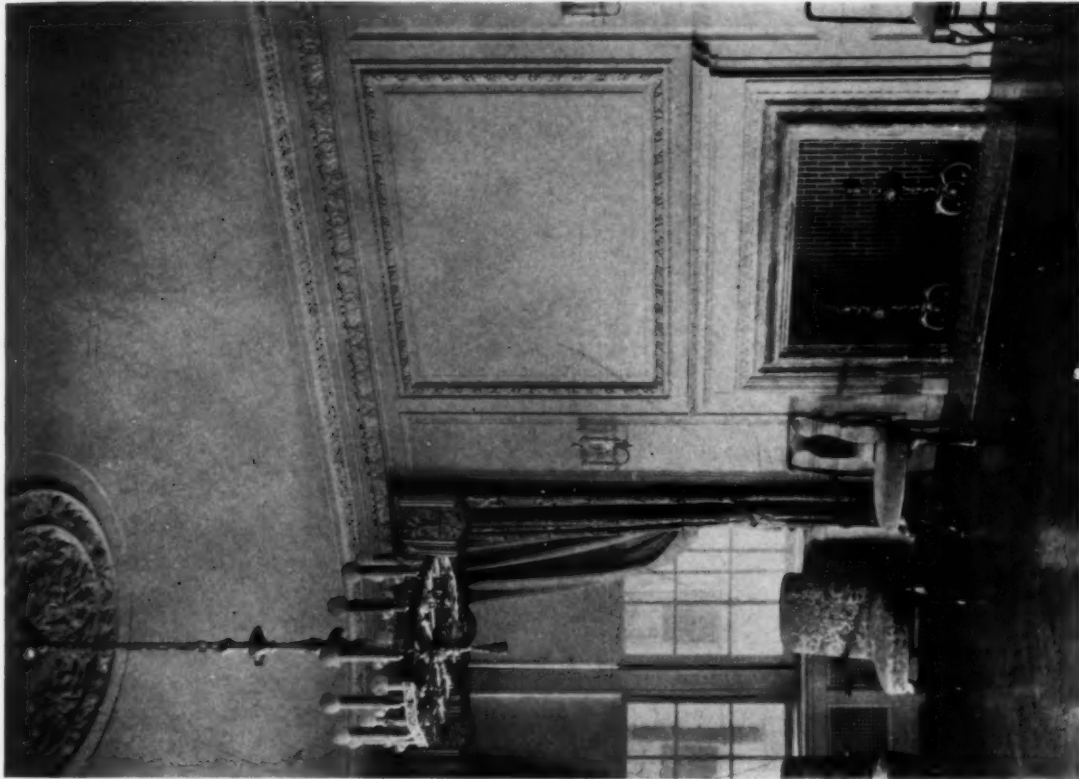




AUDITORIUM, TRAINING SCHOOL



SWIMMING POOL, TRAINING SCHOOL
CLARA FORD NURSES' HOME, DETROIT
ALBERT KAHN, INC., ARCHITECTS

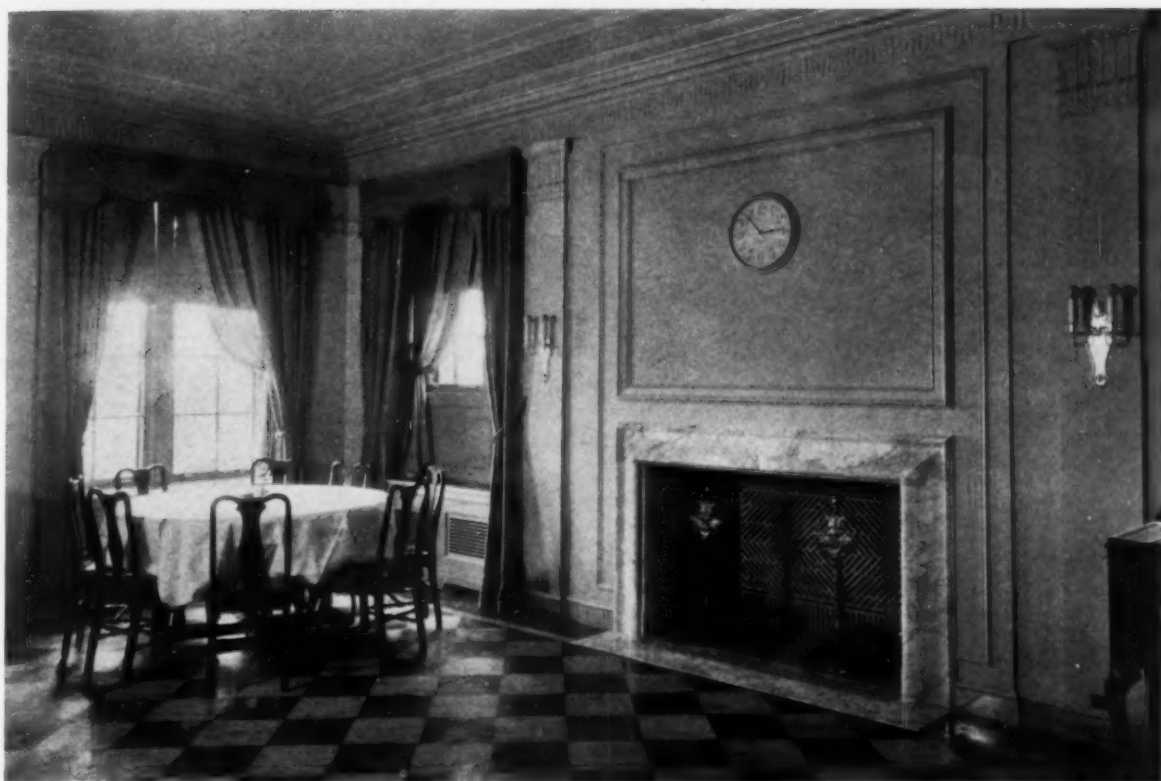


MUSIC ROOM



LIBRARY

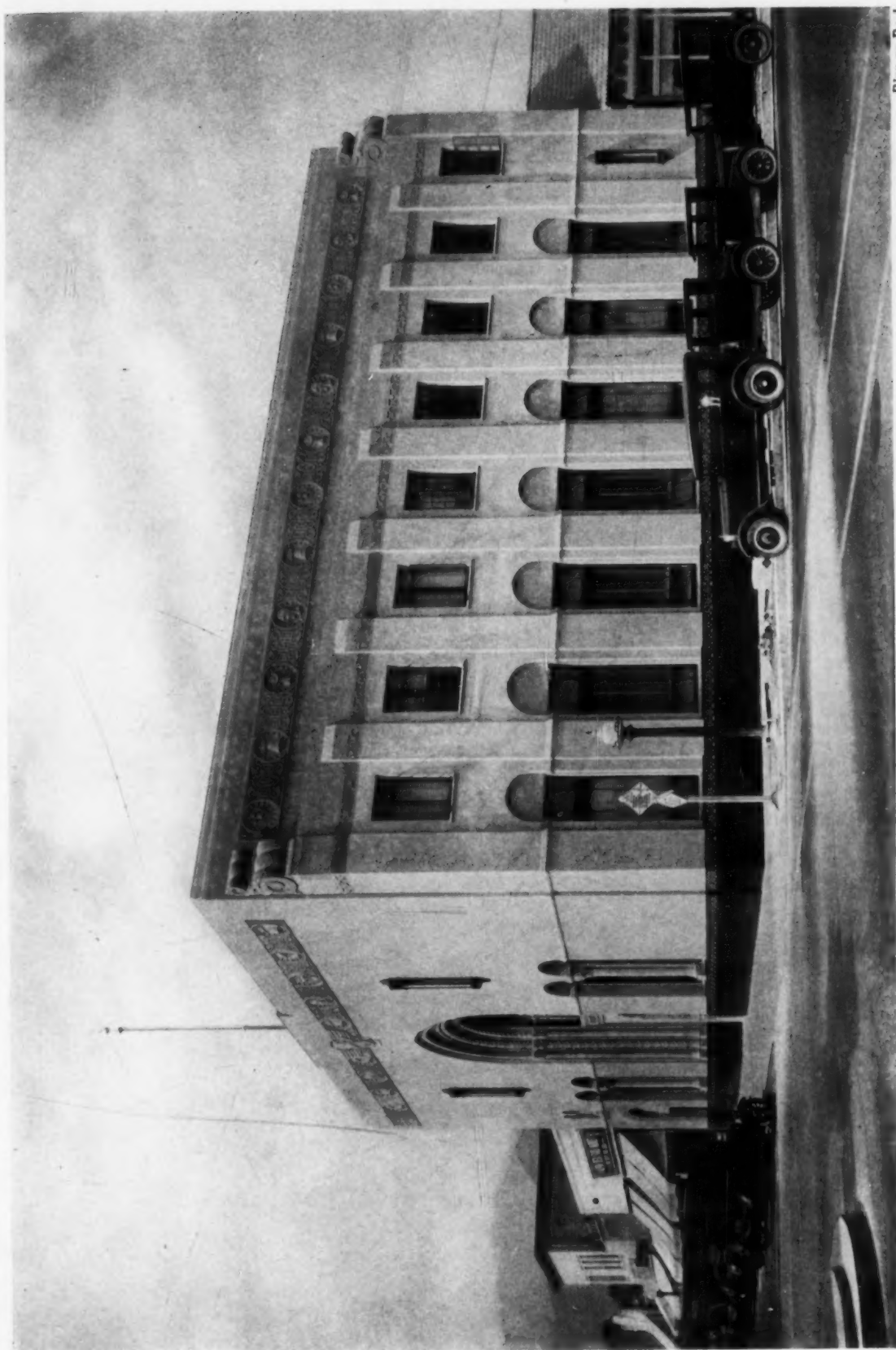
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DINING ROOM



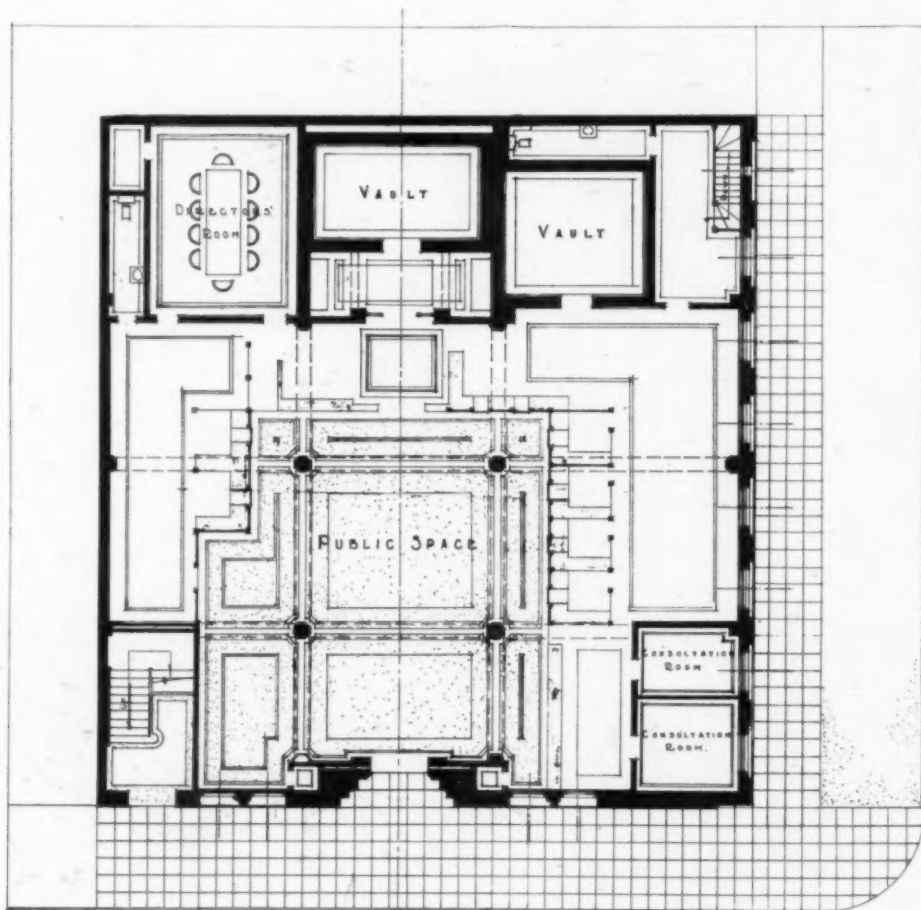
SMALL PARLOR
CLARA FORD NURSES' HOME, DETROIT
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Plan on Back

FIRST NATIONAL BANK, AZUSA, CAL.
ROBERT H. ORR, ARCHITECT

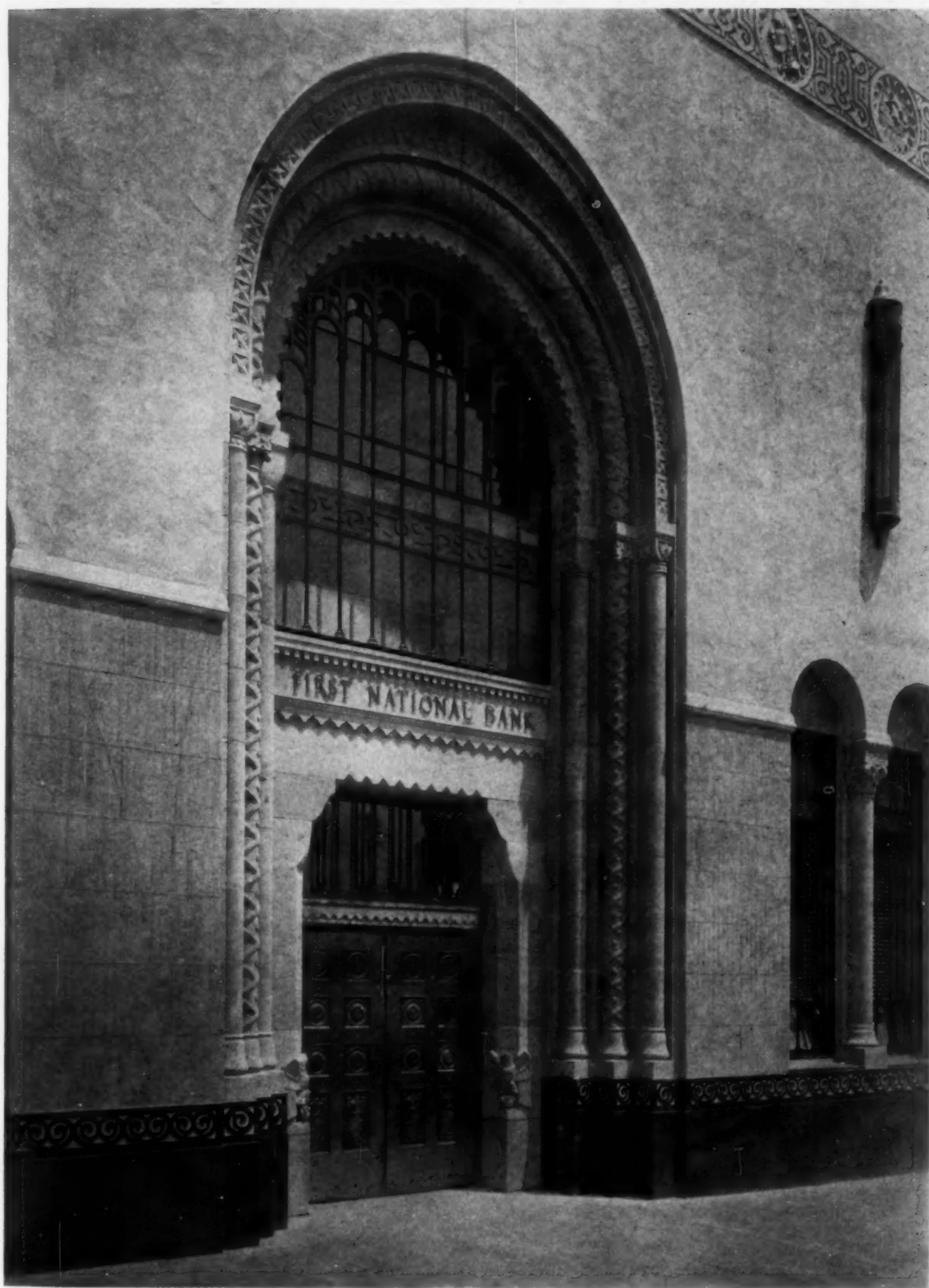
Photos, The Mott Studios



AZUSA AVENUE

FOOTHILL BOULEVARD

PLAN: FIRST NATIONAL BANK, AZUSA, CAL.
ROBERT H. ORR, ARCHITECT



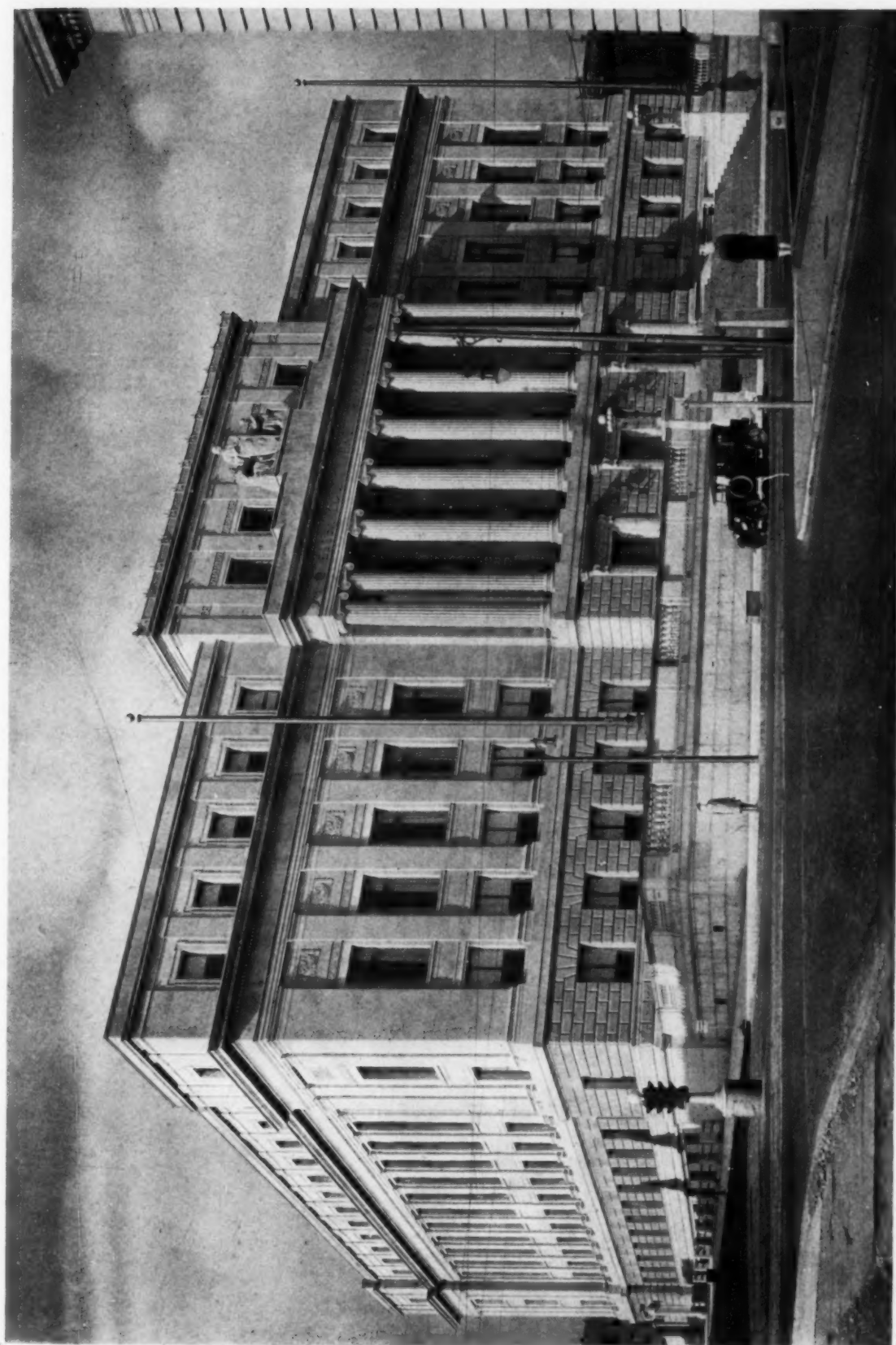
MAIN ENTRANCE
FIRST NATIONAL BANK, AZUSA, CAL.
ROBERT H. ORR, ARCHITECT





ENTRANCE TO VAULT
FIRST NATIONAL BANK, AZUSA, CAL.
ROBERT H. ORR, ARCHITECT

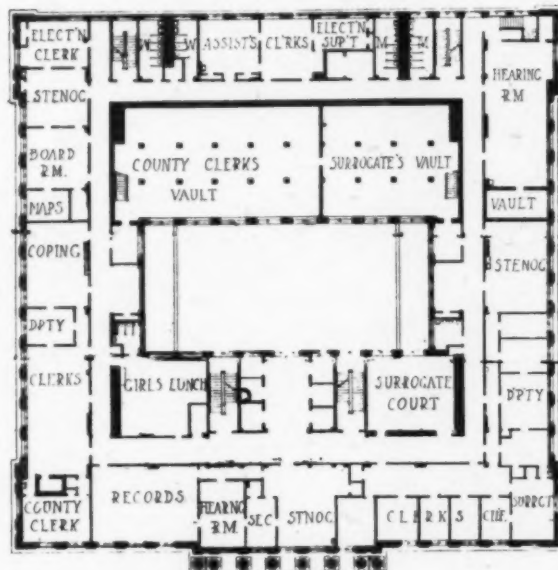




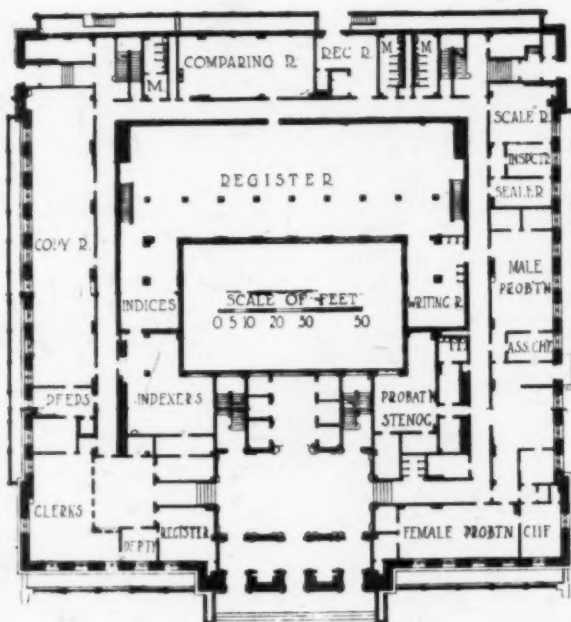
Photos. P. A. Nyholm

ESSEX COUNTY HALL OF RECORDS, NEWARK
GUILBERT & BETELLE, ARCHITECTS

Plans on Back



SECOND FLOOR



FIRST FLOOR

PLANS: ESSEX COUNTY HALL OF RECORDS, NEWARK
GUILBERT & BETELLE, ARCHITECTS

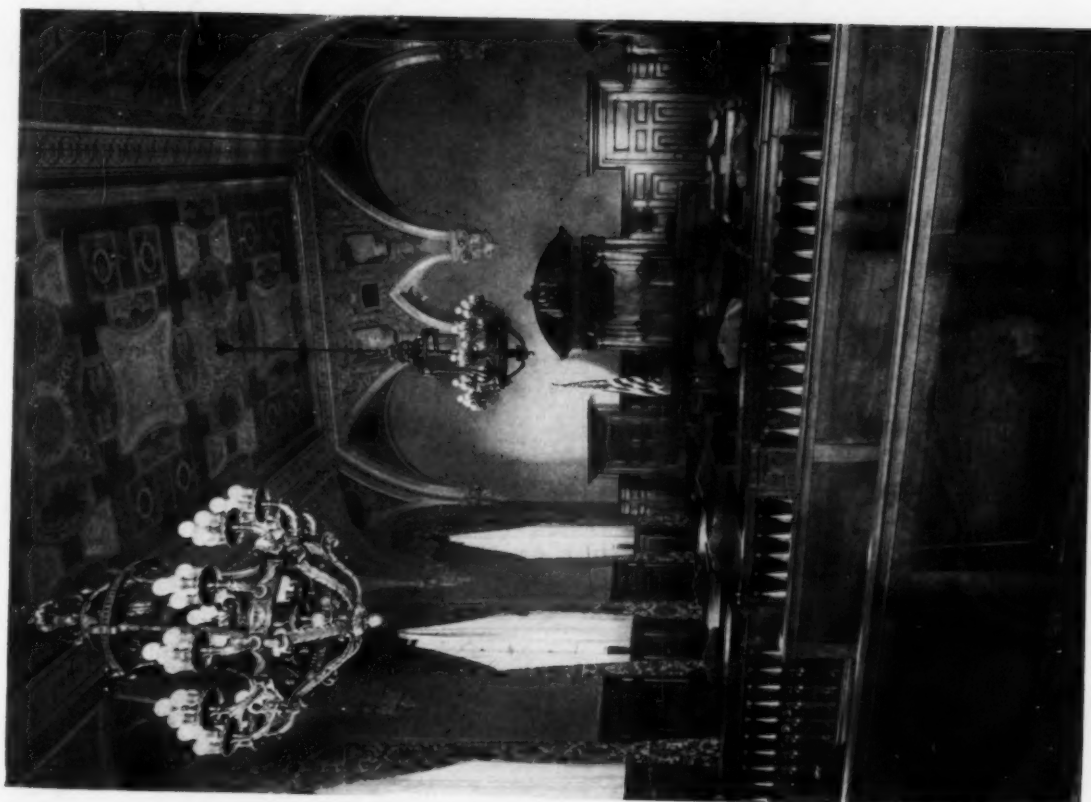


CENTRAL BAY
ESSEX COUNTY HALL OF RECORDS, NEWARK
GUILBERT & BETELLE, ARCHITECTS





GRAND JURY ROOM



BOARD OF FREEHOLDERS' ROOM

ESSEX COUNTY HALL OF RECORDS, NEWARK
GUILBERT & BETELLE, ARCHITECTS





THE DETROIT INSTITUTE OF ARTS
WITH PREFATORY NOTES ON PHASES OF MUSEUM THEORY AND PRACTICE
DEMONSTRATED IN ITS NEW BUILDING

BY
RICHARD F. BACH
OF THE METROPOLITAN MUSEUM OF ART

IT is a curious anomaly that an architect may reasonably be expected to design his building "from the inside out," but in its erection must build "from the outside in," the interior frequently being considered a legitimate stamping ground for decorators, painters and other artists, building committees, politicians and interested parties generally, not excluding the prospective occupants themselves. There are exceptions—usually public buildings of various kinds, churches, railway stations, sometimes libraries or schools—in which the word of the architect is definitive within the edifice as well as in its exterior. There is, however, but one kind of building in which his skill in design may be,—in fact, under certain conditions definitely must be,—called upon to furnish both background and complement for inanimate occupants, these varying endlessly as to the time of their origin, as to type, yet necessarily brought into harmony within their own ranks and with their new domicile.

This difficult task and real opportunity for thoughtful design is found only in the museum. Museums have much in common as to work and public relationships, whether they are devoted to art, science, history, civilization, engineering or industry, or to any one of the individual arts, sciences, processes or kinds of human effort or education which these embrace. Generalizations on the broad subject would be illuminating, and once made—as they are bound to be by practical

demonstration of theory in numerous museum buildings now under way—may well constitute a workable point of departure for any discussion of museum buildings. Our interest here is in the museum of art, and particularly in one interpretation or expression of its cardinal function of effectual exhibition.

Now, whether or not the architect is called upon, in the museum of art, only for impressive architectonic effects in formal, public or semi-public interiors; whether his meticulous orders, studied ornament and stylistically accurate cornices are to be limited to vestibules, stairways and loggias; or whether he is enlisted as an auxiliary in the actual installation of exhibits, will depend upon two things: first, the school of museum theory and practice favored by the staff of the institution in question; second, the capacity of the architect himself to appreciate the needs and functions of museums and his ability to interpret the theory of display to be carried out. On the latter of these considerations much might be, and elsewhere has been, said. We take refuge in the comprehensive and accurate statement by Henry W. Kent, Secretary of The Metropolitan Museum of Art, in *THE FORUM* for December, 1927. Suffice it here to say that in the degree that museums in their new guise, namely, as elements in the cultural (educational as well as inspirational) upbuilding of the community, become more numerous and effective, the architect will be relied upon to



The Detroit Institute of Arts
Paul Philippe Cret and Zantzinger, Borie & Medary, Architects

interpret satisfactorily their new functions and in his buildings to make feasible their difficult and now widely diversified activities. At present, with the customary brilliant exceptions, the architect has barely touched the problem; its growing insistence and the progress of thought on the subject generally will without question stimulate his interest and prompt his observation and study. For museums are destined to figure largely in our roster of new buildings, and they offer him a functional problem as practical and often as troublesome as that of the library or the school building; and they may, ere long, be included in the list of institutions which have taken cover in the tall building type. The possibilities of plan, design, illumination and so on offered by this prospect are alluring, to say the least.

Museum Display and Interior Design. Our other consideration is here especially significant, since the new building of the Detroit Institute of Arts is a definite demonstration of a type of display in which a skillful architect has been the abetter. This aspect of the general problem of museum design is of paramount importance to architects, not only because it may affect,—indeed materially control,—all or most of the interior design of art museum buildings, but also because the type of display favored at Detroit makes undeniable demands upon the architect to understand fully certain phases of museum theory. A word or two regarding these may be appropriate at this point. Museums have their business and their administration, their practice and their theories as do other forms of organized human effort. But as institutions of public service, museums have only recently come into the running. They are now developing a technique and methodology, to borrow good words from other fields, and these are calculated to serve as guides for the architect as well as for the museum official.

There is not in the vocabulary of museum work an equivalent in value to words like "teacher" or "educator" or "librarian," whose meaning is publicly understood,—no word to replace the ponderous description "museum worker," nor is there a general word to cover the whole field of museum work, acquisition, exhibition, management, education. The most important dictionaries give us only words like "museology," which means the science of arranging museums, or "museography," the scientific description of the contents of museums, or "museographer," one who writes on or classifies museum objects. In fact, the word museum itself, which we use to cover all types, in England, for instance, does not include "art galleries" where pictures are shown. This inadequacy of the language may imply lack of understanding of the type of building and work which the word museum connotes, or it may in-

dicade nothing more than inexperience. Both would seem to be true, and the correction of the latter is making rapid strides to remedy the failings of the former. The statement is included here only to emphasize in fact of the youth of the museum of art in its current conception.

The firstlings of the museum of art are to be found in private collections, and these are hardly poor men's playthings. Such collections imply important buildings, usually the palace, hotel, *palazzo*, villa or other residence of the owner, wherein he disposed his treasures to suit his taste or fancy and no doubt with an eye to making upon those who saw them such impression as was desirable of the owner's wealth, power and connoisseurship. Exhibition or display technique was not known and hardly necessary, public responsibilities non-existent. Larger palaces, to be sure, displayed important items in semi-public halls or galleries, using that term in its earlier meaning; but the decorative features had no different significance in the Palazzo Farnese than they had in the House of Pansa or the Temple of Luxor.

Due to various causes, among them war, revolution, confiscation, pillage and other expressions of international amity, many of these collections came into public hands, the method and tradition of housing them already established by their history. Many remained in their original palaces and were there added to. Slowly, very slowly, a theory of display was developed out of the facts of the material. Important buildings could not be abandoned, and new ones were too expensive. So we find various expedients relied upon to render the crowded objects visible, let alone to exhibit them well. Exigencies of space and, in general, the use of private living quarters for public display space, gave birth certainly to one museum feature of doubtful value that has run amuck in most museum plans and has cost endless sums in upkeep,—namely, the skylight. In fact, the type of reasoning, or lack of it, which prompts architects to think of museum and skylight as essential to each other, certainly of the former as inconceivable without the latter, might be text for an ample discourse on the reasonableness of design in architecture. The skylight was in the beginning and must remain, either a compromising makeshift or a basic error, depending on where it is found, and its feasibility in museums erected now should be carefully studied and thoughtfully restricted.

Period Style Display. The nineteenth century worked manfully at the task of devising ways and means of suitable display for this transferred material, expressing its findings in various directions indicated by possible answers to such leading questions as these: Shall objects be classed by material, by style, by race, or by cultural ori-

gin? Shall we have an orderly phalanx of pottery, another of wood and a third of metal, or shall we permit these to form a stylistic trio? Or, eschewing both alternatives, shall we favor a third which insists upon a harmonizing of these elements in an interior actually old, or designed in terms of the old, to give to the objects displayed a local habitation and a name? Which of these methods is or can be made the most intelligible to the public as expressive of the artistic aspect of a culture, itself the legacy of a given race or nation and of a given time or style?

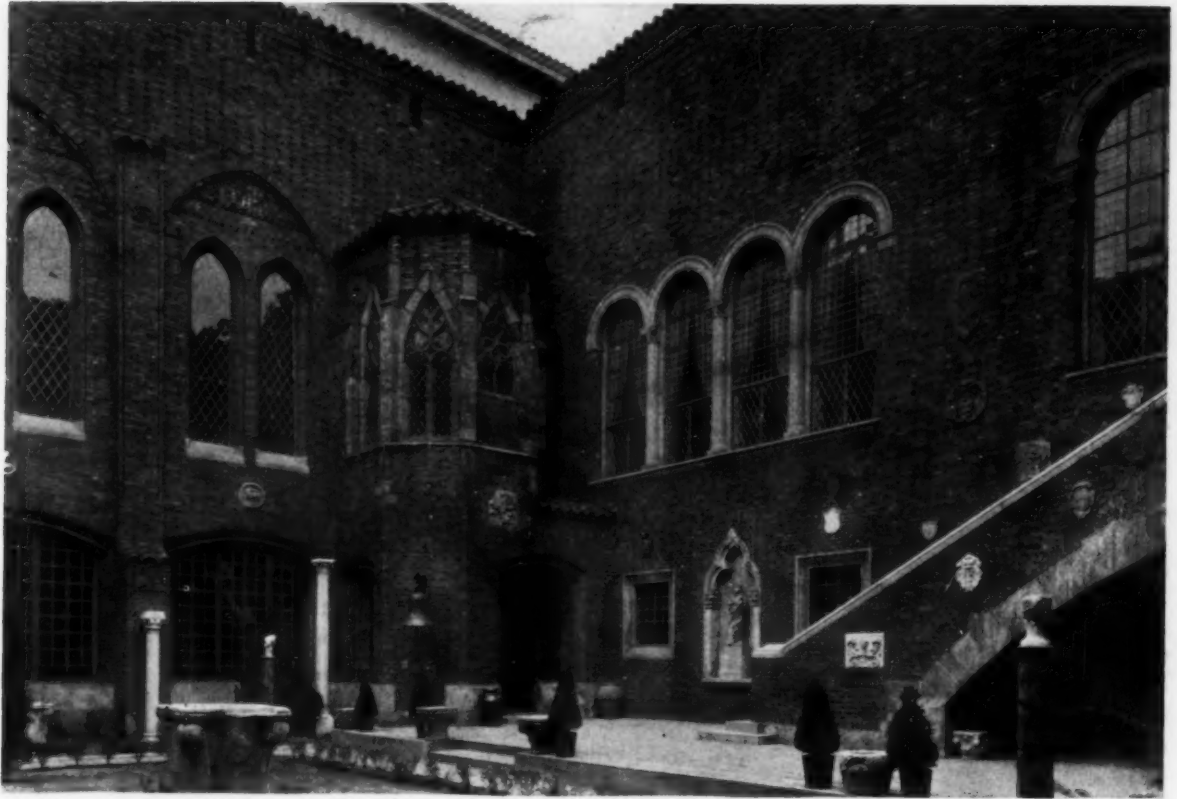
While these questions sought answer in the administration of older material, another influence was also at work, namely, the wave of interest in public education and that special phase of it fostered by Pestalozzi and others, from whom dates the importance given to "object lesson material" in teaching. Such material falls immediately into the museum collection class, and we find the idea of object teaching and the idea of the museum as a collection of demonstration material linked together in the new interpretation of public education. This received its greatest impetus in Germany and Switzerland, later in Scandinavian countries, and in its train followed the establishment of several important institutions.

On the art side the new concept favored the type of display which showed all objects as nearly as possible in their cultural relationships, conceiving of design in all forms as the servant of civilization, not only as its record. Outstanding examples of the type are the Swiss National Museum at Zurich, and the Bavarian National Museum at Munich, the one with 62 and the other with 76 exhibition units, such units being rooms, courts, chapels or other unified displays, many of them including the actual wall and ceiling paneling, fireplaces and other architectural features, these constituting the dated background for a room arrangement with portable objects of like provenance. Other important buildings falling in the same class are those, in Germany, at Darmstadt, Lubeck, Magdeburg, and that at Nuremberg, founded in 1852, and housed in a suppressed Carthusian monastery since 1857; extensions erected 1866-1902. Other buildings of this class are at Copenhagen, Denmark; Stockholm, Sweden; Bygd, Norway.

In connection with these installations it should be borne in mind that any surplus of objects still can find place in other preferably adjacent galleries, where they may be grouped according to material or by any other one-line classification. Again, that when enough entire rooms are not available, or even in addition to these, period style groupings in alcoves as shown on three sides of a room, or else smaller concerted displays of culturally related objects may be arranged, these

being sometimes relied upon more or less as footnotes to the historic rooms. There is the further practice, frequently resorted to in the collections mentioned, of designing a new environment; in other words, a new interior in accord with the old objects displayed within it. In such cases the designer may find it possible to use reproductions of mouldings and other items, or he may count upon his own skill as an interpreter of the historic style required, designing in that vein without measured duplication. In the Detroit Institute of Arts use of this last mentioned method is well illustrated and handled with consummate skill, and to that extent we may consider the new Detroit building a calculated demonstration of what has hitherto been generally known as the German method of period room or period style display. It should be remembered, however, that the method followed at Detroit has also been demonstrated elsewhere in this country. Period style groupings have long been used at the Metropolitan Museum of Art, for instance in certain of its galleries devoted to the decorative arts, while a number of actual rooms of various periods have also been installed. But the best example of the method is, of course, the American Wing, opened in 1924, which contains actual rooms, with furnishings, as well as period style displays in adjacent "feeder" galleries, in which the concerted arrangement of objects of various types is shown against a background whose effect is achieved with the aid of duplicates of historic architectural details.

For inaugurating this type of display in terms of indigenous material in the United States the honor goes to the Essex Institute, in Salem, Mass., which installed a series of early American period rooms in 1907 and in the following year moved to its own grounds a seventeenth century house destined for demolition. An extension of this principle, though not intimately related to the present matter, is the actual preservation and rehabilitation of old houses, making museums of these so as to present therein the life picture of their day. This is the case in certain degree with regard to many "national monuments" abroad, such as various chateaux and palaces in France and elsewhere, where room arrangements are preserved. In this class belong also a number of buildings in this country maintained by societies, such as the Society for the Preservation of New England Antiquities, which controls some 12 old house-museums, all furnished; by city or state governments, as in the case of the New York City Hall or the Schuyler Mansion at Albany, or by other agencies. In 1904 the Rhode Island School of Design, at Providence, built a Georgian dwelling (Stone, Carpenter & Willson, architects) as a setting for the Pendleton Collection. While the Essex



COURTYARD



GALLERY OF CONTEMPORARY AMERICAN ART



MAIN HALL



HALL OF EARLY CHRISTIAN ART

displays are actual, as is the case in the Metropolitan's American Wing rooms, the Providence setting definitely followed the type of display shown in many of the rooms at Munich and Zurich and now again shown so well at Detroit. The important consideration is, to be sure, that the architect of today has designed a new setting in an older vein and so has provided an appropriate harmonizing background or interior for a concerted display of objects disposed as nearly as possible in their life relationships. The task in the end is one primarily not only for the museum director or staff, but as thoroughly one for the closely collaborating architect, who truly designs and executes his building "from the inside out." So, if the point is raised: why all this preamble about museum installation?—is that the architect's function?—our answer is that it may be and often has been a large part of the architect's function and, in sober fact, in the Detroit Institute of Arts it is. What is more, in a museum of art, most of the interior is installation in some form; so what better can the designer of such buildings do than study the museum man's point of view, which must regard the galleries as but portions of a picture, to be completed by displays to be made there?

The Building: Exterior, General Plan and Larger Interiors. The Institute of Arts at Detroit is noteworthy, however, for more than its method of exhibit installation. There are the item of its exterior design, the item of its functional plan, and the item of its general effectiveness as an opportunity for those pleasurable reactions which are the soul and substance of art anyhow. The building itself is highly successful as a civic monument. It is of Vermont marble and was erected at a cost of something over four millions, the sum defrayed out of general taxation. How many cities can boast of similar enterprise? This may account, in part, for the fact that the new building savors a little of splendor. It is of the city, for the city, by the city, and by this token Detroit seems, at least, to throw the gauntlet to other communities of like or even greater size. The consummation of 20 years' endeavor, the perpetuation of a project launched 41 years ago under the name of the Detroit Museum of Art and now under its present aegis set up in a public building as a department of the city's work, Detroit finds this result of its striving a satisfying and impressive edifice, notably in its relation to the Public Library (Cass Gilbert, architect), completed in 1921, which faces it across a wide avenue and with which the new Institute constitutes a distinctive "point" in the city's plan, a center of arts and letters.

The building is assuredly inviting, though without humility; it beckons but does not appeal. It

gives at once the impression of a most carefully studied exterior which has been permitted to evolve slowly out of proposed use and other practical conditions, to meet which a plan and interior had first to be wisely conceived and acutely adjusted. In brief, it is what might be termed a functionally expressive design—and what else can good design in architecture be? The effect is that of a one-story structure simply treated and on a scale best described by the hackneyed word "grand," which has in its architectural use a real meaning. In fact, the true merit of this scale will not be fully appreciated until landscaping, adjacent building or other features have been developed to afford workable comparisons. A nearby apartment hotel seems mincing and overcrowded with detail, with its necessarily numerous windows. Broad values of mass and planes have told their story becomingly. Barring the Ionic entrance order, ornament has been sharply limited to rare accents in key blocks, corners of string courses and the like, while the great spread of the building—it has a frontage of over 300 feet—is enhanced by the parallel horizontals of a fine rustication, and the openings further accented by iron gates, balconies and grilles in reserved treatment.

The style would be described as Italian Renaissance modified, which means revised, modernized, applied to new ends. A Beaux Arts strain is apparent, suggesting the training of the designer, yet the resultant effect is developed by thoughtful handling, as that of an American building of 1927. The stylistic merit of the whole lies in this interaction of strains and offers another proof of the gradual and highly intelligent modification of the traditional motif, wherein lies any true advantage that may be credited to a conservative attitude toward past "periods." So here, without loss of regard for the formulary of the Italian Renaissance, which contributes to the design what may be called an artistic stability, we have the definite indication of present activity, immediate public utility, strength of purpose, all of which are characteristic of the sanest modernism.

The plan is disposed according to a basic scheme of classification of art for museum purposes, as visualized by the director. This accounts for an American section, an European section and an Asiatic section, each of which is provided for in a block or mass of the building. The major axis from the entrance is that of a main hall or concourse, continues through one of these principal blocks, namely, the Asiatic, and is stopped against a theater set at right angles to it; while the American and European blocks flank the hall.

The European galleries occupy all four sides of a rectangle and following around to the right from the entrance hall and as a chronological

sequence circumscribe a courtyard, the ground of which is the basement level of the building. The courtyard itself is an outdoor exhibition space. Its brick walls and openings are treated exteriorly to suggest the period style rooms shown within, while at the same time offering adequate background for various well curbs, columns and other objects of stone and metal exhibited there. So we have a Gothic wall with pointed arches and buttresses to aid the effect of an antique chapel, projecting from it; also a Renaissance wall with Italian stone-framed openings, and door giving upon a stairway to the court level; and on another side there are a Flemish type rectangular oriel and a series of circular brick openings. The brick cornice also varies. Diverse elements, never so on their own soil but usually at odds when recreated out of new material, have been most skillfully blended. One notes at once the practice established in similar courtyards at Munich, Darmstadt, Zurich and elsewhere, a fact which does not in the least dim the real achievement of director and architect in the present case.

In the left flanking block, assigned to American art, the courtyard is replaced by a group of three galleries devoted to temporary exhibitions, while in the block at the rear, containing chiefly Asiatic art (though there is an overflow of European and Near Eastern material), the galleries are disposed about a Baroque garden.

This is entered from the main hall through an exceptionally good iron gate by Caldwell, an old possession of the museum, while at its far end there is a loggia with a fine stairway, its halfway landing allowing height for a passage to the theater beyond. The stairway, with rail by Yellin, who has done numerous other metal items which may be construed as decorative elements of the architect's design, admits to smaller galleries, the only rooms above the main floor. These are to be devoted to modernist art, which has been segregated as though for a period of acclimation or perhaps,—according to Darwinian precepts,—to give sway to the law of natural selection!

In the garden the ornament of masks, inverted consoles, rockwork, pilaster caps, grilles and finely scaled mouldings is overborne by a fountain of exuberant proportions, which takes up much of the floor area. Its size is no doubt accounted for in part by the conception of the garden as a sort of *atrium*, in which the fountain figures as the pool or *impluvium*; its lines do seem to carry upward quite reasonably to the rectangular opening formed by projecting ends of concrete beams moulded and colored to simulate ancient wood; the rectangular ceiling opening itself is filled in by a tent cloth in mustard color with blue border, suspended from rods at the short ends of the rectangle and masking most of the skylight. De-

spite the presence of several ceramic items, not in the architect's conception, and which do not help the color of the scheme, the garden is not at the moment primarily an exhibition space. An interesting note is the fact that the wall above the beam ceiling level and supporting the skylight has been painted a light blue; in other words, treated to please the spectator. It is not fair of course to compare the Baroque garden on any terms with the courtyard, which was conceived at the outset as an open air gallery and beside which it is bound to seem showy. As part of the main axis vista, however, it falls logically into place and is pleasing.

The main hall is glorious with color, its vault and penetrations decorated in a manner possibly best described as "Pompeian to Adam," for there is much of the latter's sobriety and calm despite the still very fresh color and the strongly Pompeian sophistication of the ornament. This great central space has yet to gain the tone that only age can contribute, when surface brilliance has gone from the color, which now draws the eye too suddenly upward, and when walls and pavement have mellowed. The architecture will then serve as a unifying background for the tapestries, large sculpture and other sizable pieces to be shown here. The general proportions of this interior are superb and of imposing dignity, yet not lacking the least in friendliness. The room fulfills its chief function; while impressing the visitor with its grandeur and quality, it still draws him on.

Another highly effective feature is the unit composed of vestibule and entrance hall. Three great arches constitute the former, carrying through the entrance motif. At right and left are a check room and an information and sales desk. The entrance hall is groined; two short barrel vaults at its ends are supported by a fine Ionic order.

In the arrangement of floor levels in the building this entrance hall is an intermediate landing. There is a flight of steps at the entrance, and from the entrance hall other flights lead left and right to gallery circuits and straight ahead to the main hall, while other stairways give upon corridors on the basement floor.

The Galleries. The main floor galleries present a stimulating variety and vista. Architect and staff have collaborated to produce a chronologic sequence of historic pictures. Endless study of detail is evident on all sides, so that one finds real pleasure in the completeness of each stylistic illustration. Rooms are conceived not only as entities correct in all their parts and relationships as to period, but also as individual problems in interior design. There is color galore, all in key, all in style, and, with negligible exceptions, all thoroughly satisfying. Nor is this the only scheme of variegation. Different styles mean different floors; high, low,



Entrance Lobby



Loggia of the Rear Garden

vaulted or beamed ceilings; mouldings of changing profile; door frames to accord; wall coverings in varied hue and texture;—throughout there is the appearance of the utmost freedom and flexibility which contributes, for the visitor, the fascination of uncertainty as he goes from room to room. Two wood floors in adjacent rooms, for instance, will be laid in different pattern; two ceilings in rooms of one style will be designed one as a groined, the other as a barrel vault. Even ventilator grilles and visitors' benches change shape and color to fit room styles. The significance of all this is emphasized by the fact that the objects shown are of many kinds and materials, but have been grouped in their one-time life relationships and given solidarity by the architect's stylistic interpretation of the room setting.

Excepting the three temporary exhibition galleries and one or two spaces at angles in the plan, all these rooms are sidelighted, a departure that will merit close observation. The window opening becomes a constant of light measurement, and feasible room sizes are thus determined. Yet, despite this definite control, rooms of nearly identical sizes give the effect of having quite different proportions; others are worked out as multiples of the basic unit, which is about 24 by 28 feet. The circulatory system of galleries, the course of art flowing through rooms arranged in series, is eminently sensible and instructive, the building itself becoming a textbook in period design. The

itinerary, begun at the right of the entrance hall, carries one first around the open court, next to the rear around the garden, then forward again to pass around the American circuit; things of most recent production, and especially loans, being sought in the galleries of temporary exhibitions. Here classic Greek motifs in a wide frieze establish a quiet background that even the Da-daist of a minute ago could hardly object to, in view of the possibilities of contrast with it, while in the gallery of twentieth century American art the ceiling borders and other features have been concocted out of the prevailing feeling and elements of current American decorative art.

Of special interest here also are one or two specific items of installation. There is shown a two-story early American house, the whole facade of which (a copy) has been included. The upper floor of this is reached by its own original stairway. The house is a unit, and its one door is both entrance and exit. The visitor is thus placed definitely in the environment to which the house belongs. Before it, as though on a street, he may pass the house and go on to other galleries. A somewhat similar scheme is followed in a French eighteenth century room. Being too small to fill the gallery, it was set away from the window, which would have given too strong a light. The space between the room and the outer wall is treated as a trellised enclosure suggesting a garden; this, illuminated from the large window,



Corner of the Gothic Hall



Detail of the Garden

is seen through the smaller opening of the old room and gains the effect of outdoor brilliance. These are but indications of the degree of skill and the thoughtful care which have everywhere inspired the work of both staff and architect. The lesson of German and Swiss period style method has been assimilated, improved upon, and entirely adjusted to current American need.

Lower Floor, Utilities, Theater. But the functional aspect of the modern museum plan is tested not only by galleries but also, and perhaps more severely, by the administrative and "housekeeping" arrangements. The disposition of these facilities on the ground floor of the Detroit building is illuminating as indicating a type plan first given definite form in the Cleveland Museum of Art, erected 1915-16 (Hubbell & Benes, architects). There are here a special business entrance and a shipping entrance. The former gives upon two corridors at right angles; at the point of meeting is an information and control desk, with telephone switchboard. On one corridor a row of offices includes in planned sequence the director's office, trustees' meeting room, and quarters for several curators. On the other, again in studied sequence, appear the secretary's office, general clerical office and the registrar's office. These two series complete two sides of the plan under the left main mass of the building, the third side being devoted to a textile file, exhibition and study room. The central space directly beneath the

temporary exhibition rooms is given to a lecture hall, with a seating capacity of 500 and with booth and equipment for stereopticon and motion picture projection. The decorative scheme here is slightly modernist, pleasingly so. There are two entrances to this hall, giving upon a corridor from which wide doors lead to a large circulation area and exhibition space at the center of the building, just under the main hall, windows toward the opposite side opening upon the outward court. Two additional exits are provided flanking the stage. The lecture hall is completely encircled by corridors, the party walls at the sides of the room being pierced by a row of heavily curtained French windows. Checking-, smoking- and rest-rooms, with toilets, are readily accessible, placed just under the entrance hall.

Around the courtyard we account for the library, convenient to the stairway, and also for print study and storerooms and for print exhibition space. There are here, on two sides of the court, two long galleries devoted to exhibition material classed as prehistoric and as ethnographic, neither of which could logically find a place in the main floor sequences. On the third side is a series of study rooms for European art, especially necessary in a museum arrangement of this sort where all material of a kind on hand cannot be shown, because the principal concern in the main galleries is the complete period style disposition. These study rooms will be the haven of

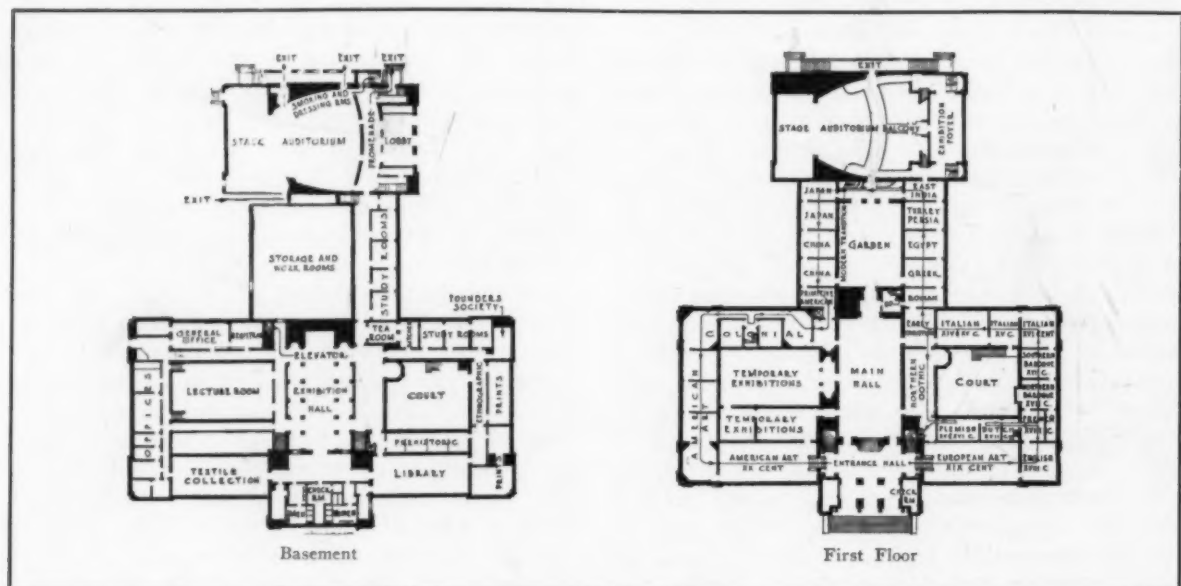
persons specially interested in specific types of material, such as, for instance, metalwork. A similar series, for Asiatic art, runs directly beneath the galleries devoted to this field. Just at the angle of the building provision is made for a public tea room and kitchen. Under the Baroque garden there is a large space for dark storage, and elsewhere on lower levels additional rooms are available for box storage, and space is allowed for a staff lunch room and kitchen. In various parts of the attic level a number of lofts offer further space for object storage, as well as accommodations for a photographic studio. Deliveries pass the offices of secretary and registrar and are made under control of the superintendent, whose office is adjacent to that of the registrar. A raised loading platform gives access to a spacious receiving room, where objects are unpacked and inspected and from which an adequate freight elevator carries them to all levels of the building.

Under the ground floor level various utilitarian purposes are met,—a plenum chamber is under the lecture hall, and under the main storage room is equipment for vacuum cleaner, current control, ventilating and air washing and humidifying apparatus, the latter again for the lecture hall. Heat and current are obtained from outside sources. Ventilating and humidifying equipment for the galleries is placed in an attic loft. Artificial lighting throughout is of total-direct type, in some cases as on pictures supplemented by individual reflectors. Wherever glass ceilings are required these are contrived as removable units and effective spots of interest obtained by cut and matched

sections in pleasing patterns. At the rear of the building, facing on another street, a well equipped theater completes the plan. This is calculated to meet a community need, not only for dramatic performances but also for concerts and important meetings. It contains a large organ. The interior is quiet, tasteful and impressive; the exterior profits by a seemliness which brings it into pleasing continuity with the museum structure itself. On the balcony level is an exhibition foyer.

The merits of the Detroit Institute are many; the promise of its usefulness is large. It has certain great advantages:—a really functional plan; a well conceived and well maintained display method; a fine building, historic yet modern; a reasonableness and simplicity of arrangement; an appropriateness of interior design; a well studied regard for the practical utilities of administration and technical services. Some may well say that the scheme of gallery installations suggests that of the Munich Museum or that the general character or "feeling" of the whole interior suggests the Darmstadt Museum. In the final analysis we say with conviction that this building and its collections as they now stand have made a distinct contribution to museum theory and practice in the United States; have in truth made fact out of much that could hitherto be classed only as experiment.

Pope, in the "Essay on Man," writes: "Charms strike the sight, but merit wins the soul." There are charms here, many of them, and they register well, but the basic merit of the Detroit Institute and of the idea it represents is real and inspiring.



Plans: The Detroit Institute of Arts

Paul Philippe Cret and Zantzinger, Borie & Medary, Architects

MODERN ARCHITECTURE IN HOLLAND

TEXT BY
EDWIN A. HORNER
PHOTOGRAPHS BY
SIGURD FISCHER

✓ **T**O the average American who pictures Holland as a land of windmills, wooden shoes and Delft pottery, it will no doubt be a revelation to learn that in her principal cities during recent years there has been a volume of building activity sufficient to open the eyes of the most ambitious real estate operators on Long Island. Her prosperity, a result of her having rich colonial possessions and on account of her neutral attitude during the World War, is evident at every turn, and her architects are contributing much toward the development of a logical modern architecture.

In attempting to present a comprehensive impression of the best of the modern architecture in Holland, Sigurd Fischer and I soon found ourselves confronted with a task which was out of all proportion to the amount of time at our disposal. Arriving in Rotterdam on July 24, 1928, it had been our intention to set out at once for Amsterdam, and after spending a week in that city to proceed by motor into Germany and the Scandinavian countries. However, difficulties which arose over failure of automobile insurance papers to arrive necessitated a delay of several days, which though at first disconcerting enabled us to become fully familiar with the building situation in Holland and prevented our doing it the injustice of neglecting it. Even then, we learned of several excellent examples of architecture which it was impossible for us even to see.

There is today much talk about a new, a modern architecture which will be a true expression of both function and construction. In the beginning all buildings, whether for shelter or worship, were purely utilitarian structures. As man developed, his temples and tombs became more refined in proportions and were embellished with ornament, culminating in the perfection of the Greek orders. These were a true expression of the logical use of the materials at hand to solve the problems of shelter and protection with the utmost possible beauty. Today our lives are more complex, and our requirements more numerous, with a corresponding increase in the number, nature and uses of materials at our disposal. Nevertheless, the same principle still applies to an even greater extent, that architecture in most cases is primarily functional and secondly æsthetic; a structure must first economically serve the purpose for which it is intended, and in so doing be a pleasure to the eye. In Holland at present there exists a group of architects who, in creating new designs, hold uppermost in mind two qualities,—namely, logic and simplicity. The extremists of

this group go so far as to contend that nothing that is not absolutely essential to the function of a building should be included in its design; that there should be no ornament whatsoever. This idea is consistent with the theory behind the modernist movement that, in order to produce a new architecture which will be appropriate to our time, we must begin with the barest necessities and evolve a new style. Fortunately, however, the Dutch architects have thus far been prudent in acting upon this theory, for, unlike the modernist, they take into account the fact that architectural styles are not the product of a lifetime or of a generation, and that to discard all knowledge derived from precedent is sheer folly. In addition to applying logic and simplicity in the individual unit, the Dutch architects, and likewise the German, are giving a great deal of attention to city planning. Mr. Van Esteren, of The Hague, who is among the leaders in the modern movement and who has recently been awarded the commission to revise the plan of Unter den Linden, in Berlin, points out the importance which is being given to the effect of the group or ensemble, both in form and color. Interviews with several of the prominent Dutch architects produced a unanimity of opinion regarding the lack of uniformity in the architecture of New York and showed a preference for the rows of high-stoop brown-stone houses with their backyard courts and the plain shafts of some of our tall buildings because of their simple truthfulness. A strong criticism was expressed on the superimposing of "European castles" and classic temples on the tops of otherwise good skyscrapers, and in a number of cases the Medical Center, in New York, by James Gamble Rogers, was commended as an example of the possible pleasing aspect that could be attained throughout a great city by the proper handling of plain masses, giving them solidity and dignity.

The most conspicuous phase of this city planning trend in Holland is in a number of coöperative groups of attached and semi-attached residences in such cities as Amsterdam, Haarlem, The Hague and Scheveningen. These are, as a rule, municipally owned and leased to individual tenants for nominal rentals. A very charming example of this type of city planning is the group of coöperative dwellings in Haarlem, by Mr. van Loghem. These are designed for the middle-class tenant and comprise a group of 52 houses or attached units, planned about a central court, the whole scheme occupying a fair-sized city block. On the more important street the plan breaks



Pavilion No. 2, "Zonnestraal," Hilversum
Duiker & Bijvoet, Architects

back to form an open court, which lends dignity to the principal approach to the group. In the center of the court facade access is to be had to the inner court through an arched gateway over which hangs a most delightful little balcony. The architecture throughout is the essence of simplicity,—plain mouldings, excellent proportions and an effective use of color being the outstanding features. Not the least of the charm of the whole composition is in the roofs of gray tile, a material that is very much favored for this purpose in Holland. Another example of a similar group is the block of workmen's dwellings in Scheveningen by Mr. Zwart, of The Hague. Here a school is made the center of interest in the plan, and the group is arranged about two courts, one of which serves as a back yard for utilitarian purposes. In the ground stories of some of the units there are shops and stores. A rather unusual and unique residential block has been done by S. de Klerck, in Amsterdam, consisting of an entire city block of tenement dwellings. The colors of mellow red

brick and roofing tile and the deep and unusual shadows cast by irregular projections are quite interesting, but one is inclined to wonder at the logic behind the tall pyramidal turret, and the cigar-shaped bay window hanging on the corner!

The first building to attract our attention as being a product of the modern trend in Holland was the Catholic parochial school for boys in Rotterdam. The architect, P. G. Buskens, of Rotterdam, by the skillful use of masses and the discreet placing of a few colorful ornaments in terra cotta, has produced a building that is most pleasing in effect. Just the right amount of interest is added to the design by the simple means of employing projecting brickwork at corners and in window panels. At Hilversum, W. M. Dudok has done a number of very good schools, illustrations of which may be shown in these pages. Here again we find the interest of the design contributed largely by the effective use of mass and color, with the simplest of ornament used sparingly. Mr. Dudok frequently protects the entrances to his schools

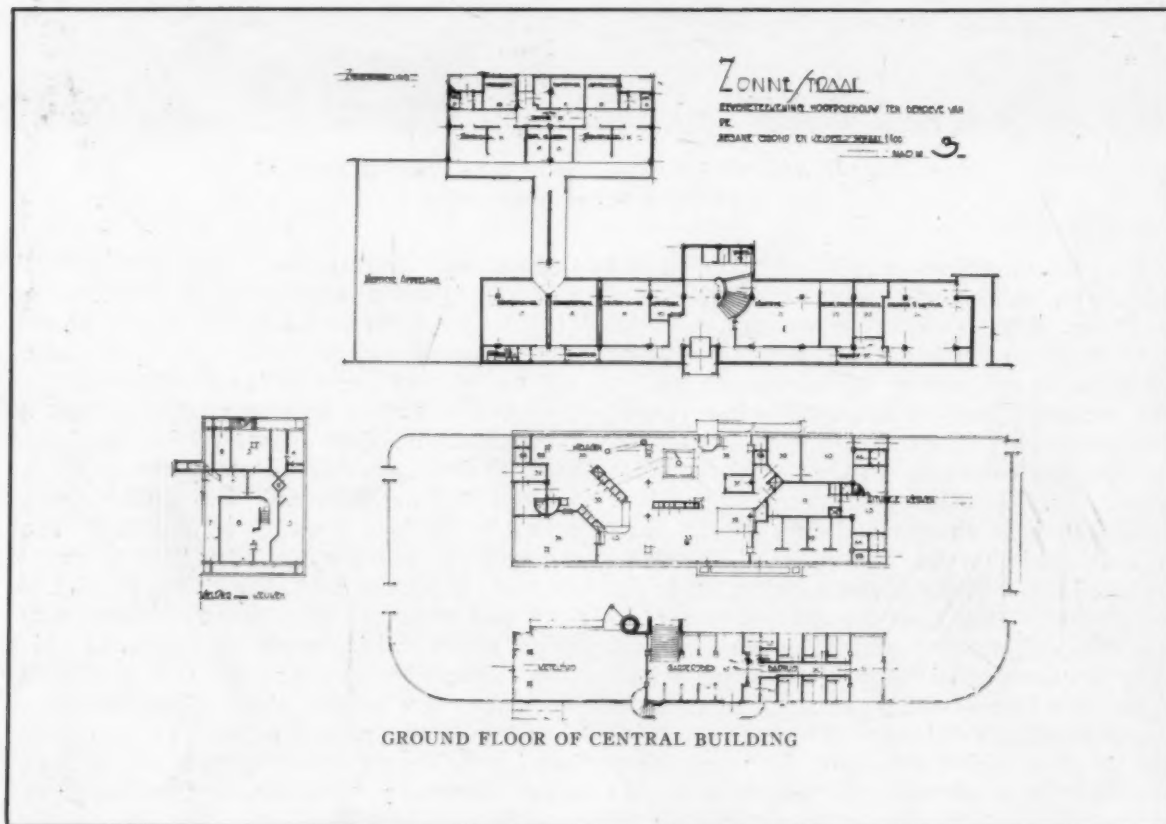
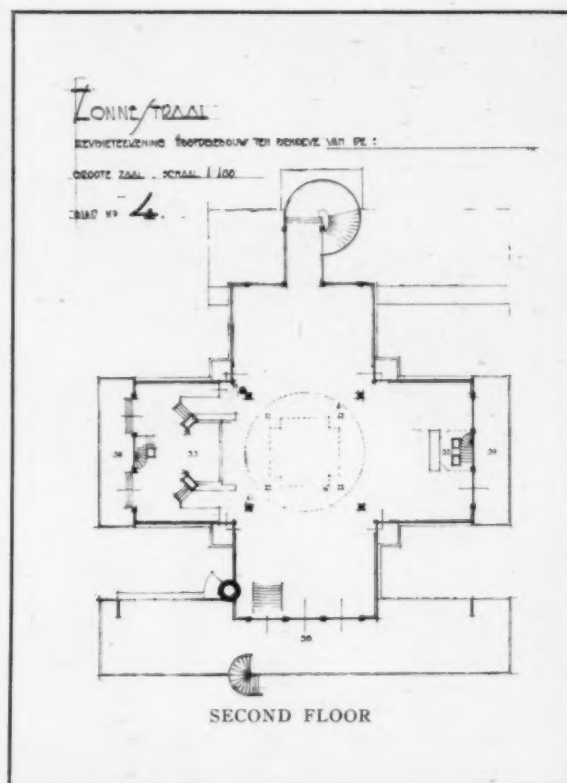
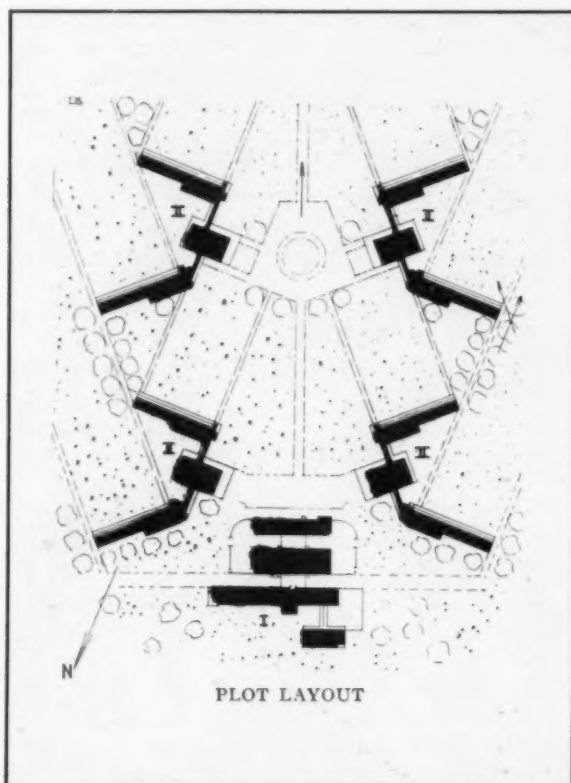


Dining Room, Central Building No. 1, "Zonnestraal," Hilversum
Duiker & Bijvoet, Architects

with a concrete slab porch roof, supported on two sides, with the opposite corners projecting as a cantilever. Although in one or two instances the result is not unpleasant, one somehow feels that the detail is used chiefly for effect, and that at least ostensible support under the corner would ease the mind of the average layman who approaches the entrance. In the corridors of his schools Mr. Dudok has used wainscoting of buff brick with base courses and caps of the same brick dipped in hot tar. End joints of all courses are butt joints with no mortar showing, the bricks being beveled back from the exposed corners to permit actual mortar joints. The cap course of black or tar-dipped brick projects about 1 inch beyond the face of the wainscoting to take the plaster above, which is applied on common brick laid up flush with the face of the wainscoting. The floors are of white tile about 10 inches square with black borders on the classroom sides and with each classroom door emphasized by a break in this border strip. The *Badhuis* or pub-

lic bathhouse, at Hilversum, is also by Mr. Dudok and is designed in much the same manner as are his schools. Here he has employed well proportioned masses, a clever arrangement of ventilating louvers, and a few spots of brilliant color to produce an excellent building of great simplicity.

Reference has here in several instances been made to the use of color as an important part of modern Dutch architecture. Too much emphasis cannot be put upon this, for it is the skillful use of strong color combinations that lends a unique charm to everything in Holland. The Dutch have been past masters of its use, as shown in the bright colors and immaculate condition in which they paint and keep their river and canal craft. They now have brought this medium into use in their architecture as an inexpensive means of enhancing the beauty of flat surfaces, to the consequent elimination of unnecessary ornament and mouldings. Combinations of such colors as yellow, gray and orange; green, gray and black; blue, with touches of red and yellow; black with



PLANS: "ZONNESTRAAL," HILVERSUM
DUIKER & BIJVOET, ARCHITECTS



STAIRCASE, CENTRAL BUILDING NO. 1, "ZONNESTRAAL," HILVERSUM
DUIKER & BIJVOET, ARCHITECTS

touches of one or two contrasting colors, are very pleasing on plain slab doors and on wood trim, both exterior and interior. The Central Post and Telegraph Building in Rotterdam, although completed in 1923, may be included in our discussion of modern architecture. The building is constructed in two units; the great hall, which is of reinforced concrete throughout, was designed by J. Huisman and is structurally independent of the main office building by which it is surrounded. The main building is by Mr. Bremer, now city architect of The Hague. The chief architectural interest in this building is the manner in which the structural concrete has been treated to produce an excellent vaulted interior. Dark glazed terra cotta in interesting geometrical designs has been effectively used in the lower portions of the walls. Another building for much the same purpose, but designed in an entirely different spirit, is the new Post and Telegraph Building at Haarlem, designed by J. Crouwel, of Amsterdam. This is, in my opinion, one of the very best examples in Holland of the skillful use of mere materials of construction, such as brick and metal sash, to form an interesting and pleasing composition, with only a few bits of well executed sculptural ornament. There is a simple dignity about the building which is in keeping with the function which it serves. Diagonally across from the Post and Telegraph Building in Haarlem is the *Nationale Bankvereniging*, by H. F. Mertens, architect and engineer. Though not essentially modern in the strictest sense of the word, this structure illustrates the possibilities in the use of brick offset by well designed sculptured ornament. The interiors in plain plaster with green glazed terra cotta wainscots are exceedingly simple, but in good taste for a small banking office. In Haarlem there is also a small church of quite unusual design, the *Kapel Nieuw Vredenhof*, by H. Korringa. In plan, the auditorium is essentially an isosceles triangle with the rostrum at the apex and the base angles cut away, a shape which presents an interesting problem in roofing. The solution is successful, lending a unique charm to this little chapel in its wooded surroundings. Here again we have simplicity, logic and a careful selection of the quality of color and texture of materials playing the chief roles in the creation of a good building. Another church of similar interest from the standpoint of irregularity of masses is the First Church of Christ, Scientist, at The Hague. The architect, H. P. Berlage, has used green prism glass, laid up in mortar with the brickwork as a means of lighting the auditorium. In the building for the *Rudolf Steiner Klinik*, at The Hague, another phase of the modern trend is illustrated. In his effort to make the building fit into the landscape

on a site which in irregular plan and contour forms a promontory in relation to its surroundings, the architect, Jan. W. E. Buijs, has accomplished quite an extraordinary result. This idea of fitting architecture into the landscape is no doubt inspired by the work of Frank Lloyd Wright, who is held in great esteem in Holland.

Outside of Hilversum, hidden away in timberland, is one of the very best of the modern buildings of Holland. *Zonnestraal*, the tubercular sanatorium designed by Duiker & Bijvoet, of Amsterdam, may at first glance convey to the conservative mind an impression of extreme modernism. Consideration of the nature of the problem, however, convinces one of the absolute logic behind every detail of this excellent group of buildings. An institution for the treatment of a disease requiring for its treatment fresh air, sunshine and cleanliness, has been done in immaculate white with a maximum area of glass in movable units. The plan is so arranged that all wards and private rooms command a clear vista over wooded land, at the same time permitting the sunlight to reach all patients' rooms to a maximum degree in winter, when it is most needed. Also at Hilversum, Mr. Dudok has built two very good residences,—his own and another very similar in design on an adjoining lot. These houses, which would fall in the \$50,000 class in the United States, were built at a cost of 25,000 guilders, or \$10,000. This is partly accounted for by the fact that a skilled laborer in Holland receives a wage of five guilders a day, or about \$2.

In the art of planning, the architects of Europe may well afford to study American methods, for their plans are often quite naïve in the inefficient and impractical arrangement of space and fixtures. But in the art of creative design we in America will do well to heed the work of our contemporaries on the continent, for they are achieving a truly new architecture. This development is especially true of Holland, Germany and France; and while we may hesitate to accept as art many of the results of their efforts, our urban population will appreciate their attempt to cope with the battle between ideas and materials. In his sketch of a plan for Paris, Le Corbusier says: "The new event is the machine, which has reconstructed modern society from the ground up. However, we have not yet measured its significance. A revolution opposed to all previous centuries! No revolutionary spirit reigns, but we stand in the presence of revolutionary relations. We will formulate no revolutionary solutions, but will adjust ourselves to a revolutionary state of affairs. If this adjustment does not soon take place, the growing sickness now threatening us will injure, even if it does not shatter social life."

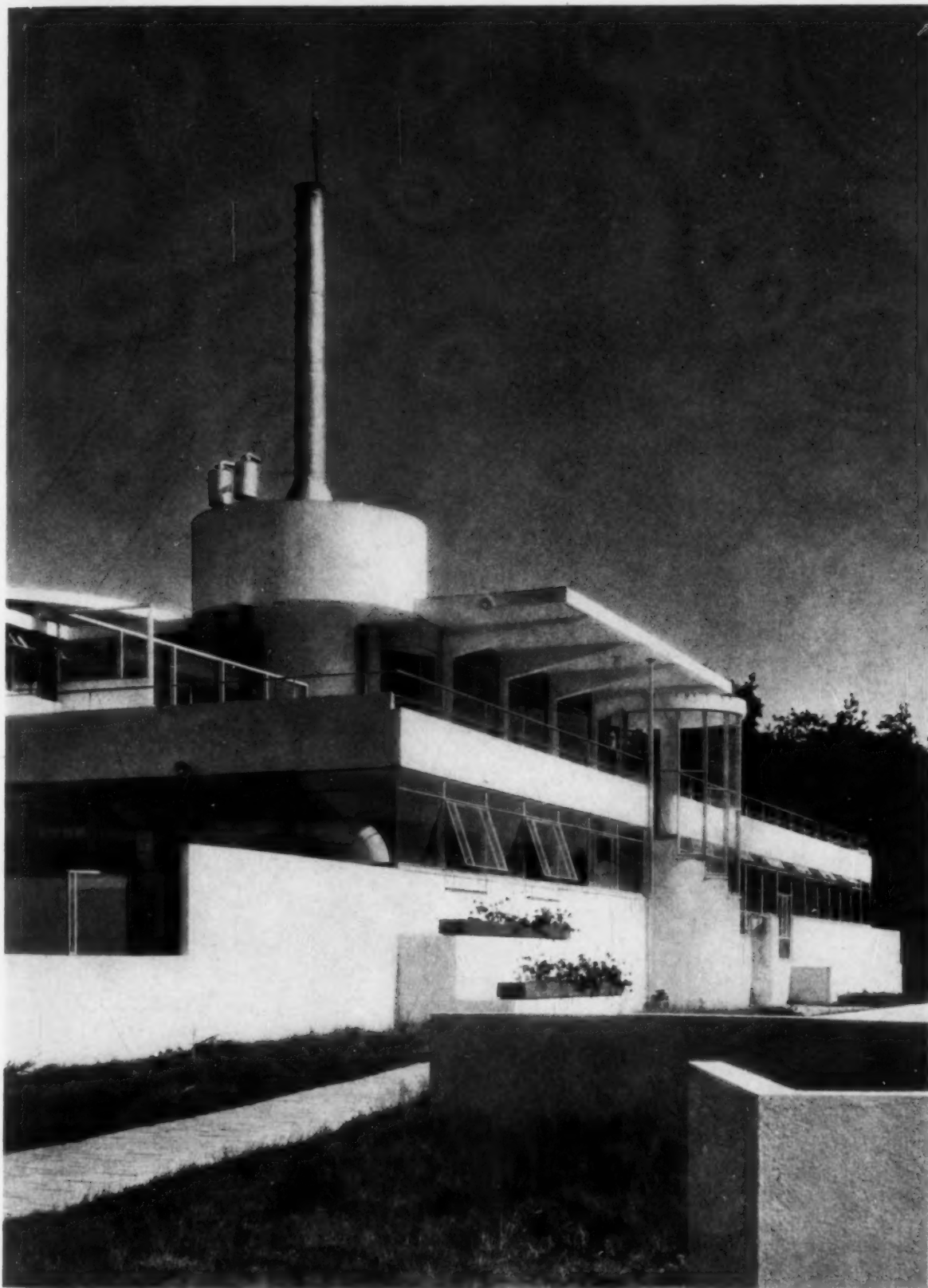
Twentieth Century European Architecture

FIVE years ago the late editor of THE ARCHITECTURAL FORUM, Albert J. MacDonald, together with Paul J. Weber of Boston, one of the leading architectural photographers in this country, spent four months in Europe securing a collection of unusual photographs of the best architecture of the past, many of which have been published from time to time as THE FORUM Studies of European Precedent. Five years have brought a great change in the architecture of this country as well as of Europe. A new expression in design, characteristic of the civilization of this age, is slowly but surely asserting itself,—an expression largely freed from the influence of the architecture of the past, and possessing a greater freedom, simplicity, logic and fitness than any architectural style in over a century. This new architecture should not be termed "modern," as it is modern only in the sense that it is the work of the present age. It is more truly the architecture of this twentieth century, evolved and produced by the requirements, the custom and the taste of the civilization of today, an age of great commercial, scientific and mechanical development, an age of high mental pressure and great physical strain, an age of tremendous wealth and unlimited possibilities. It is inevitable that this new era should demand and produce in all the arts an expression, individual, original and thoroughly characteristic. In Germany and Austria this breaking away from precedent first became evident, later gaining impetus in Holland, Sweden and Finland, and finally it has been embraced by all the spirited younger architects and designers of France, where work is being done so radical in character as to challenge the understanding and criticism of the more conservative members of the profession throughout the world.

Realizing the tremendous influences rapidly changing the character of all the arts, and the great interest being taken by American architects in the new architectural expression, the editor of THE ARCHITECTURAL FORUM last summer commissioned Sigurd Fischer, one of the foremost architectural photographers and critics in this country, to visit Europe and make a series of photographic studies of the best and most interesting examples of the new architecture of Holland, Denmark, Germany and Sweden. It is now our pleasure to present as the first of this series of illustrations of twentieth century European architecture, a group of recent buildings in Holland, in which the new architectural expression is brought out in a definite and consistent manner. During the present year, in each of the regular issues of THE ARCHITECTURAL FORUM, this series of remarkable studies of recent European architecture will be continued.

PARKER MORSE HOOPER



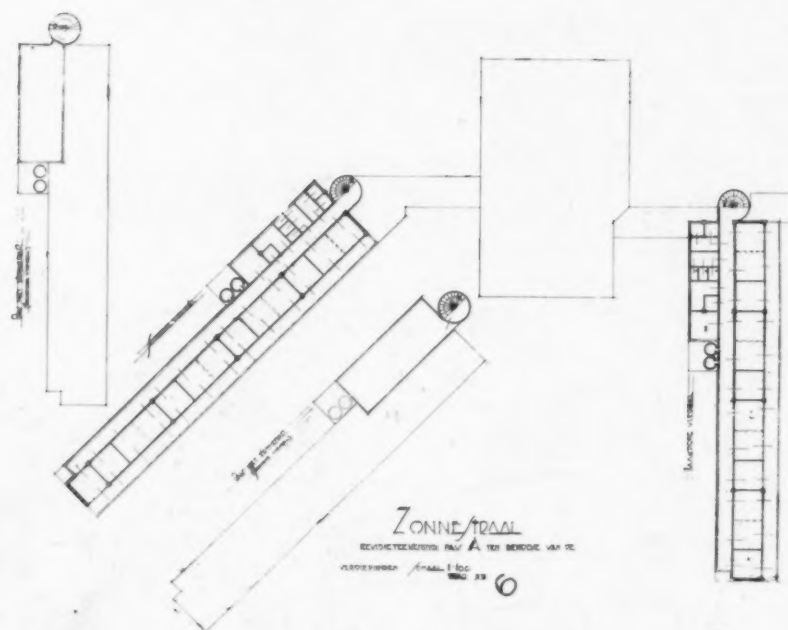


Photos. Sigurd Fischer

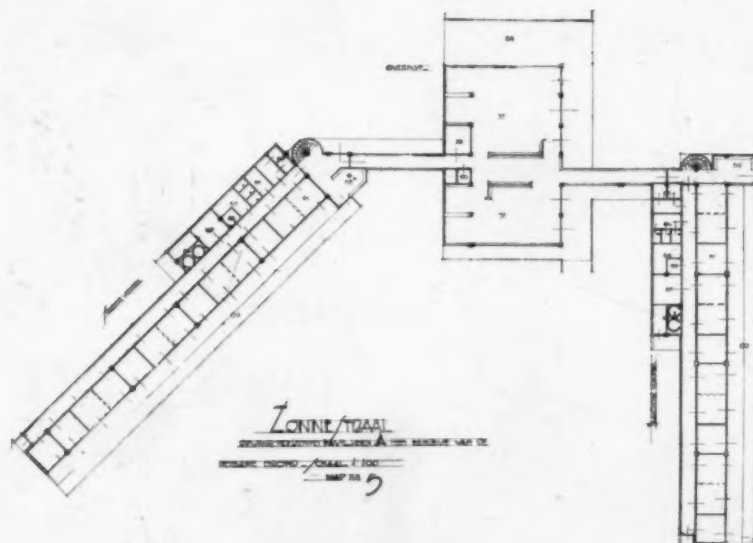
Plans on Back

✓ SOUTH FACADE OF CENTRAL BUILDING No. 1, "ZONNESTRAAL", HILVERSUM
DUIKER & BIJVOET, ARCHITECTS



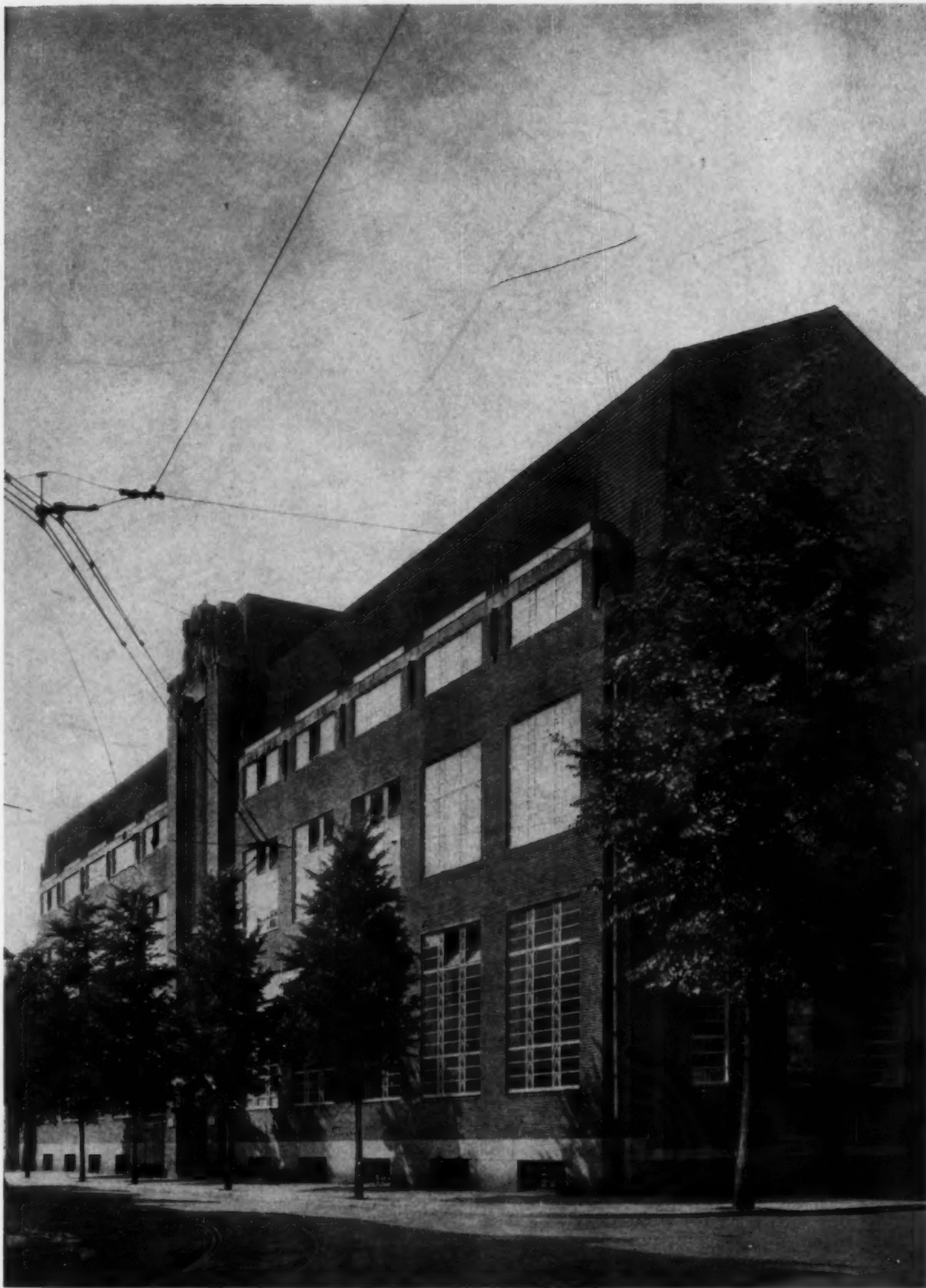


SECOND FLOOR



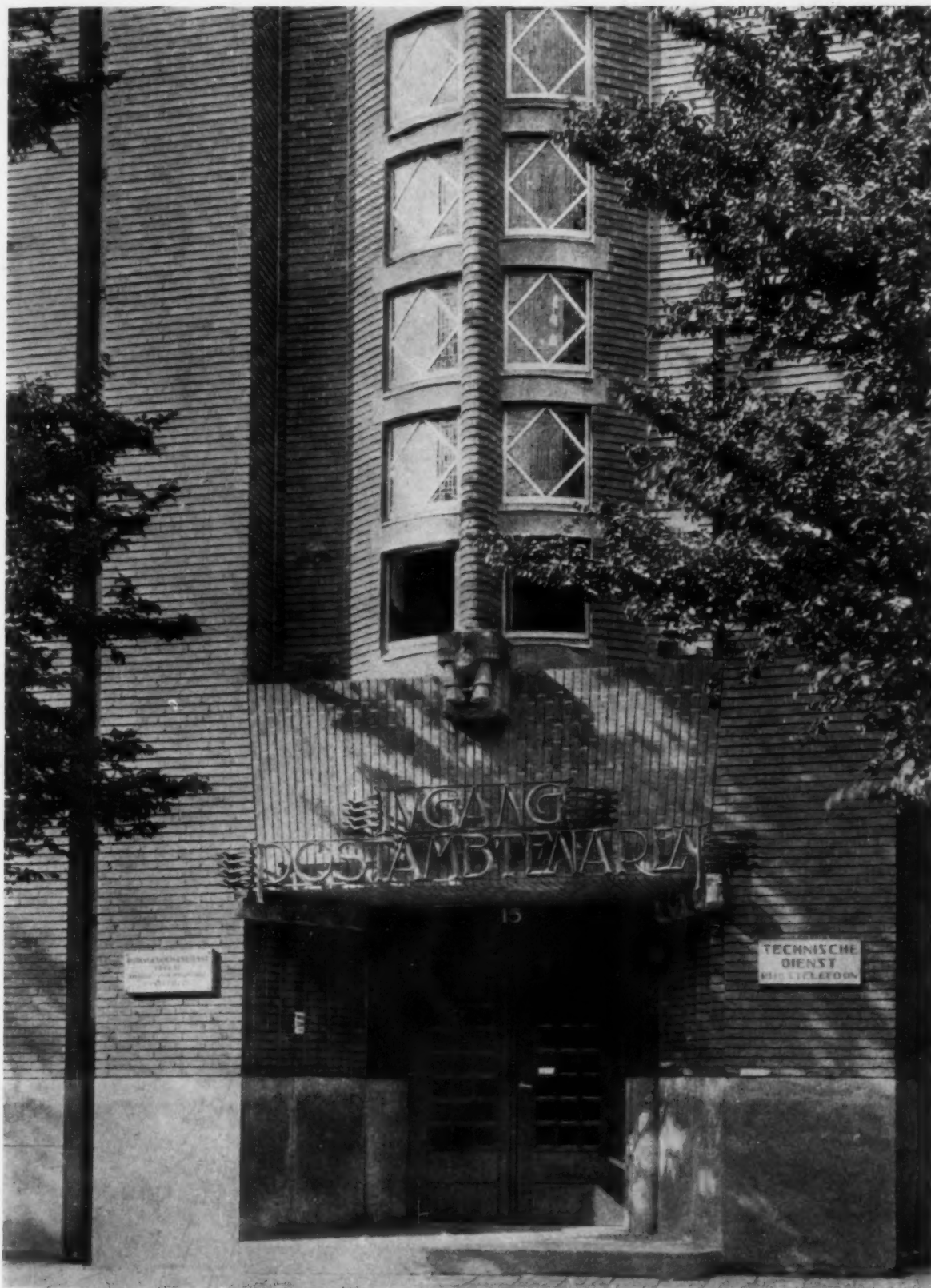
FIRST FLOOR

PLANS OF PAVILION: "ZONNESTRAAL," HILVERSUM
DUIKER & BIJVOET, ARCHITECTS



POST AND TELEGRAPH BUILDING, HAARLEM
J. CROUWEL, ARCHITECT



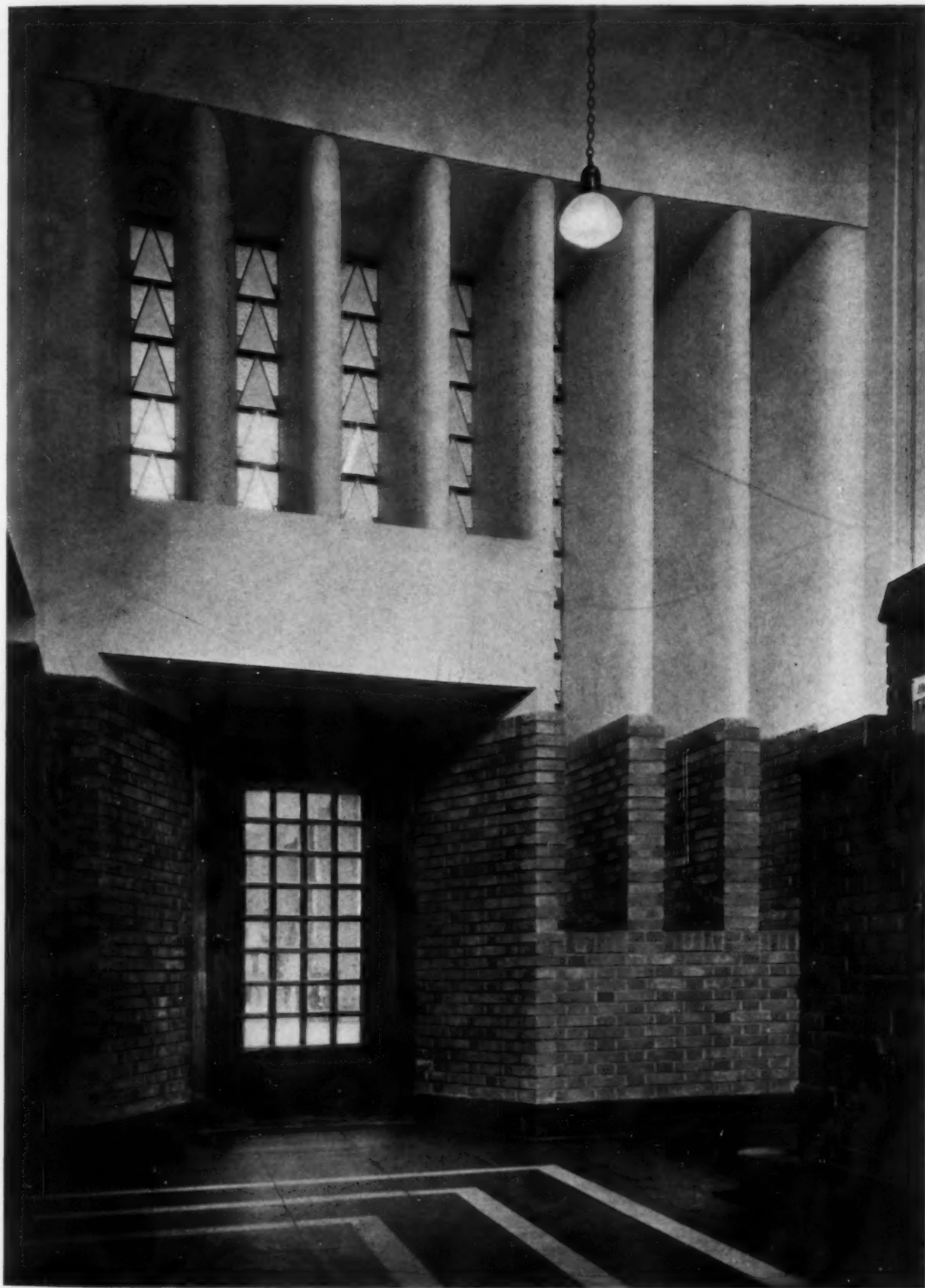


ENTRANCE TO POST OFFICE, POST AND TELEGRAPH BUILDING, HAARLEM
J. COUWEL, ARCHITECT



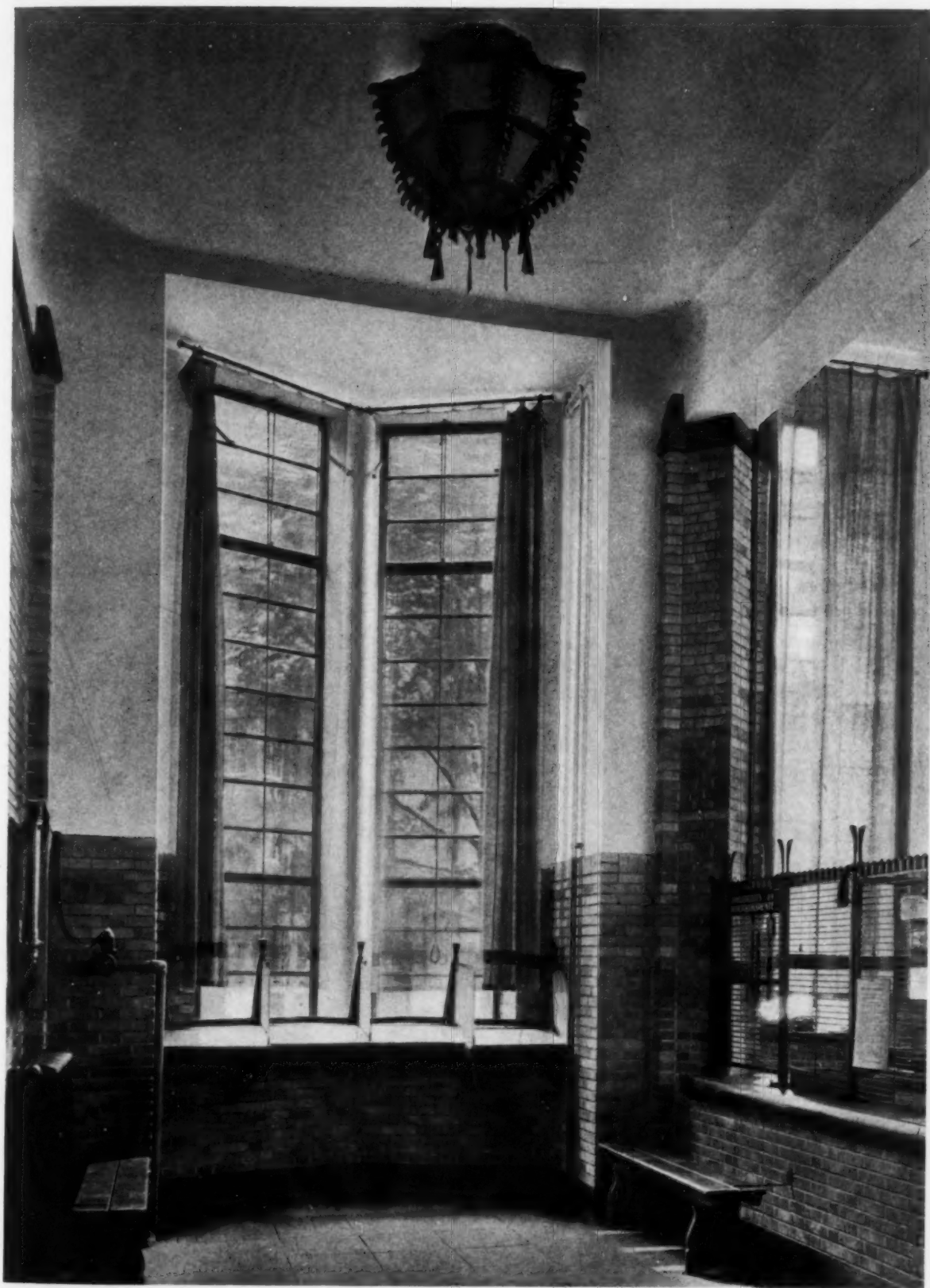


ENTRANCE TO EXECUTIVE OFFICES, POST AND TELEGRAPH BUILDING, HAARLEM
J. CROUWEL, ARCHITECT



STAIR HALL, POST AND TELEGRAPH BUILDING, HAARLEM
J. CROUWEL, ARCHITECT





BAY WINDOW, POST AND TELEGRAPH BUILDING, HAARLEM
J. CROUWEL, ARCHITECT



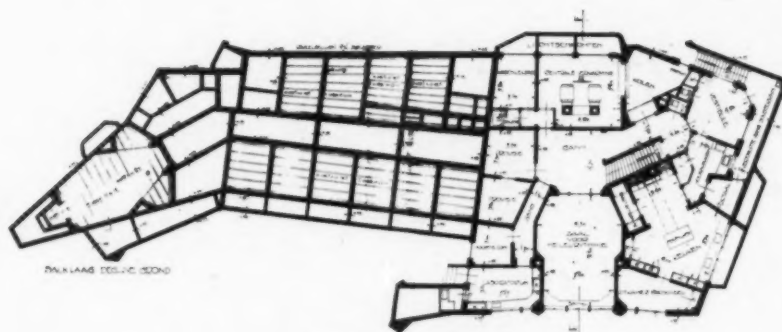
INTERIOR OF POST OFFICE, POST AND TELEGRAPH BUILDING, HAARLEM
J. CROUWEL, ARCHITECT



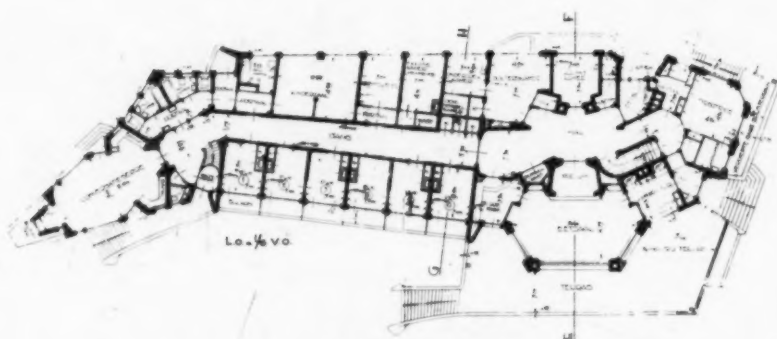


RUDOLF STEINER CLINIC FOR NERVOUS AND MENTAL DISEASES, THE HAGUE
JAN W. E. BUIJS, ARCHITECT

Plans on Back

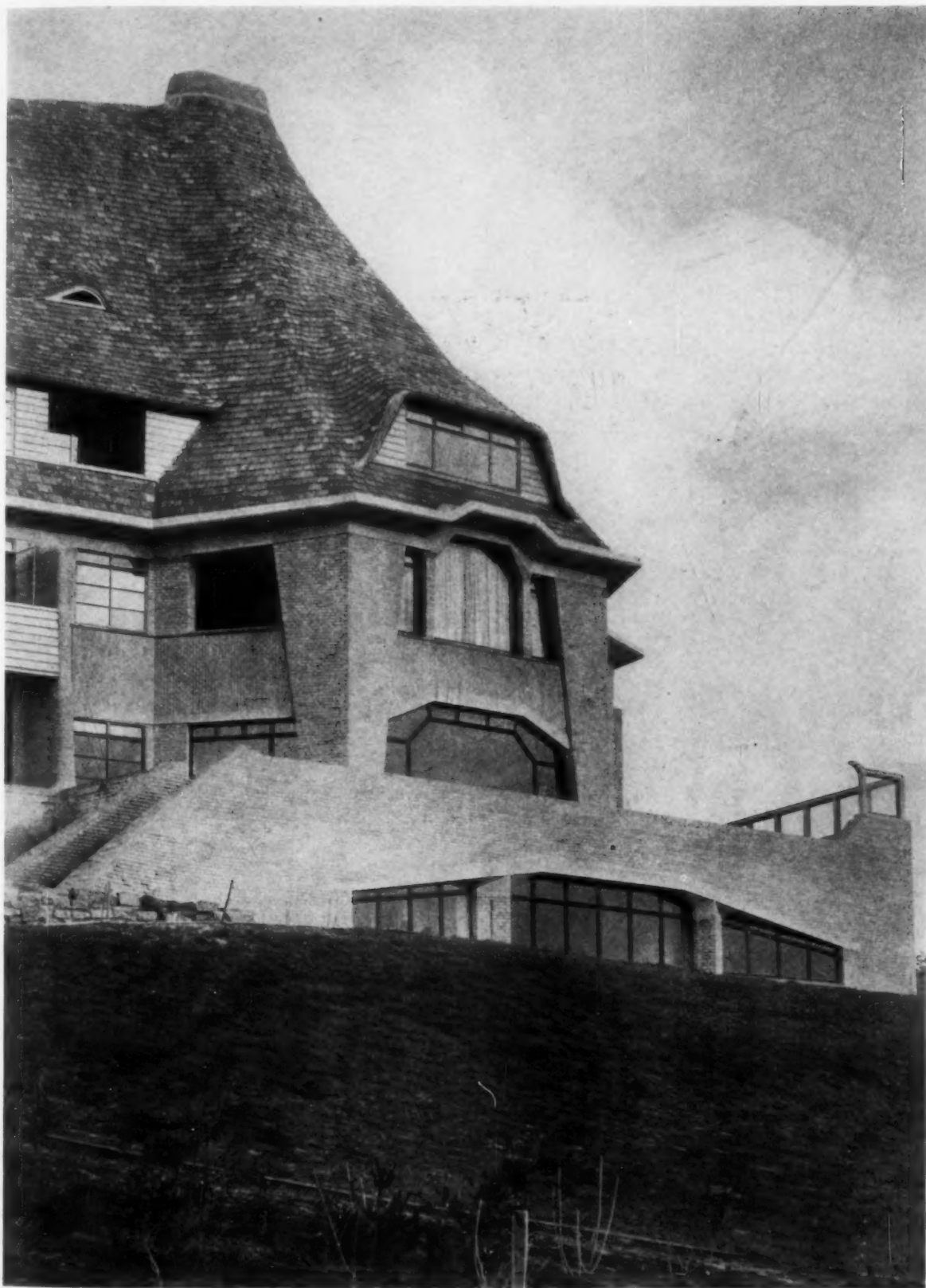


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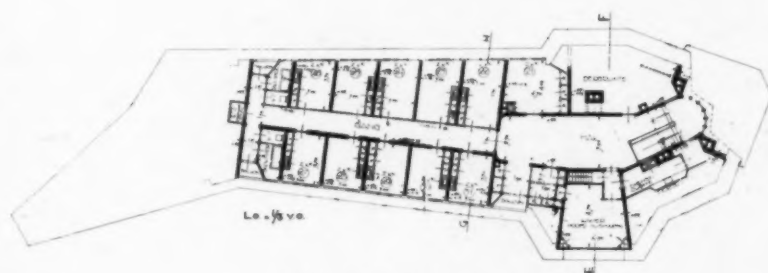
FIRST FLOOR

PLANS: RUDOLF STEINER CLINIC, THE HAGUE
JAN W. E. BUIJS, ARCHITECT

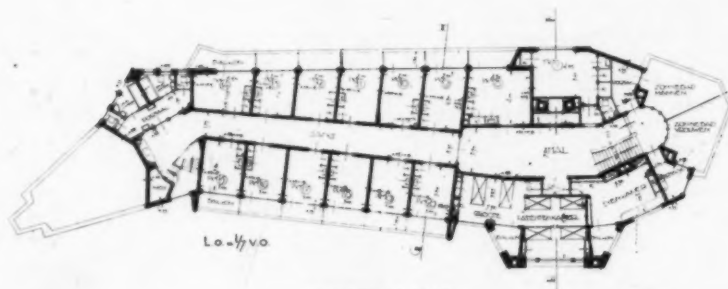


DETAIL OF BAY, RUDOLF STEINER CLINIC, THE HAGUE
JAN W. E. BUIJS, ARCHITECT

Plans on Back



FOURTH FLOOR



THIRD FLOOR

PLANS: RUDOLF STEINER CLINIC, THE HAGUE
JAN W. E. BUIJS, ARCHITECT



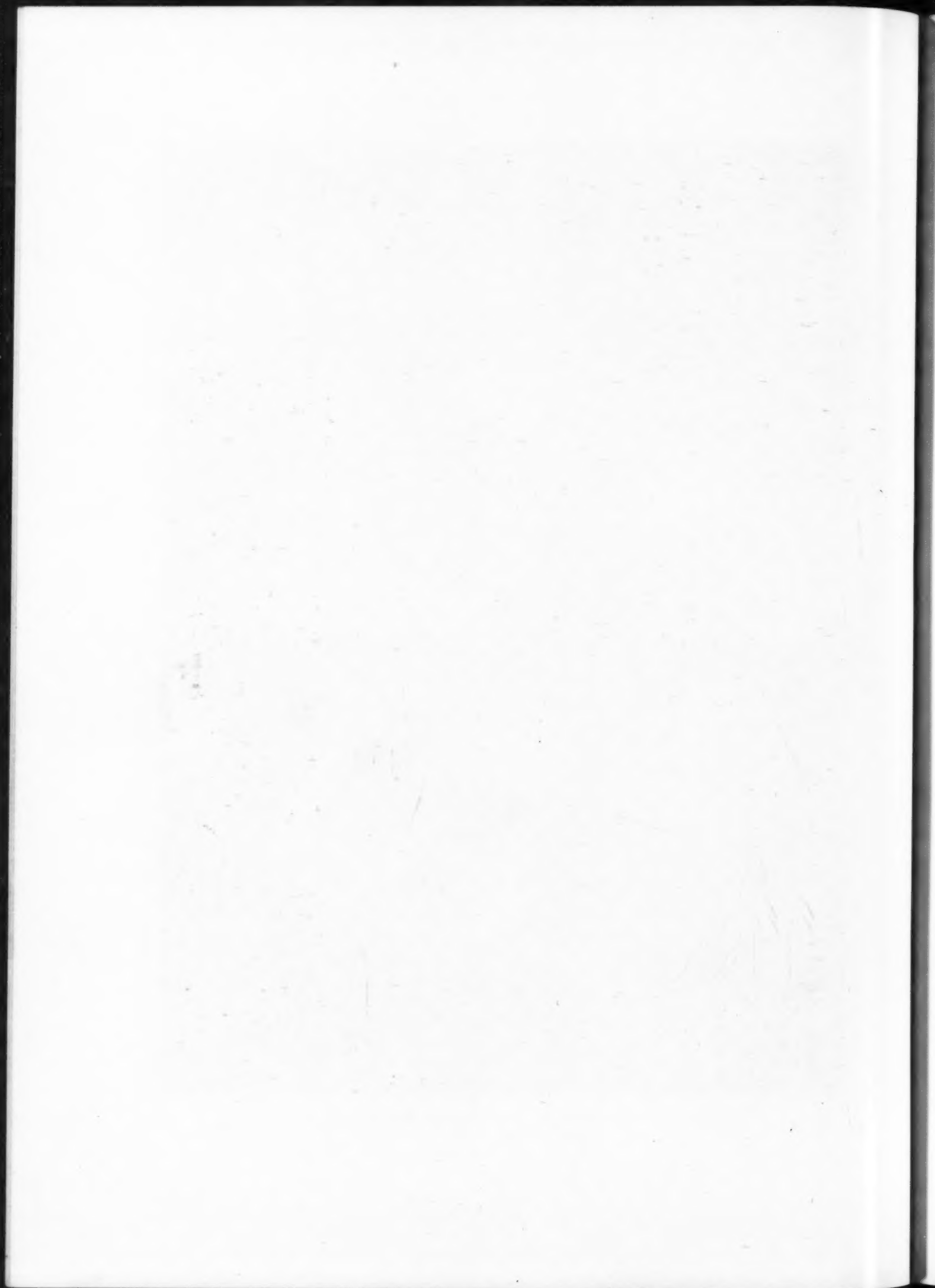
APARTMENT HOUSE, AMSTERDAM
PETER KRAMER, ARCHITECT

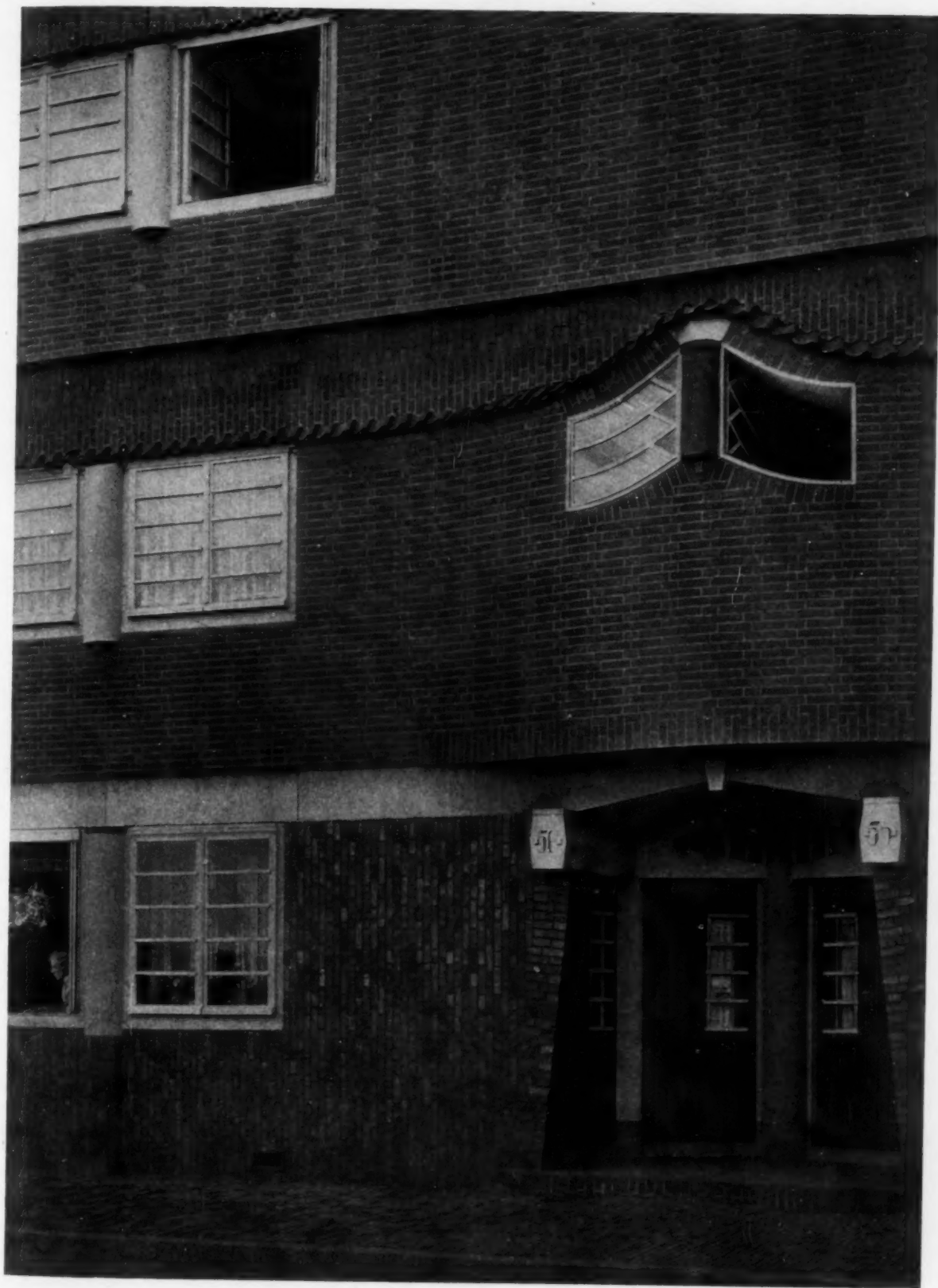




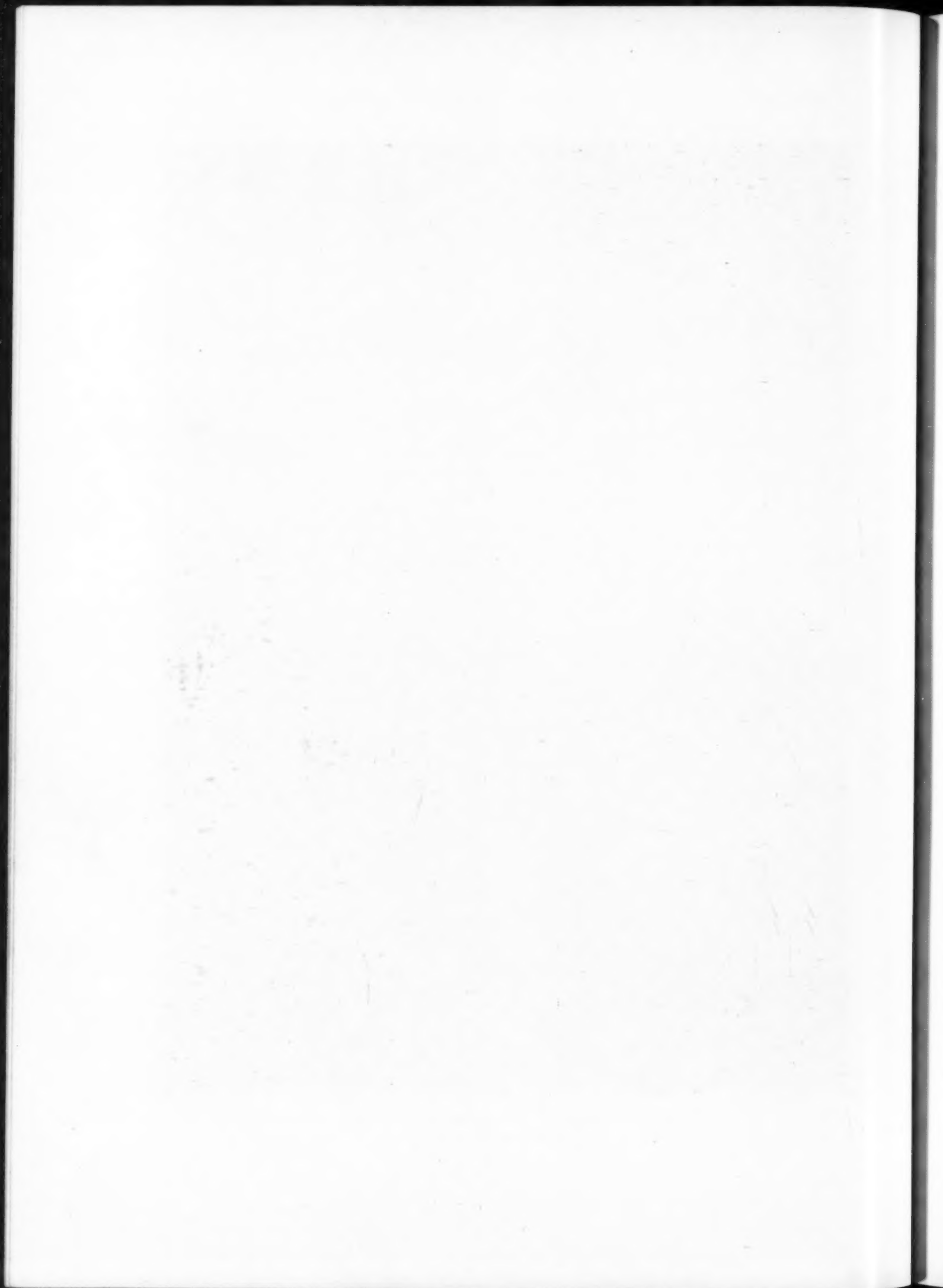


APARTMENT HOUSE, AMSTERDAM
S. DE KLERCK, ARCHITECT



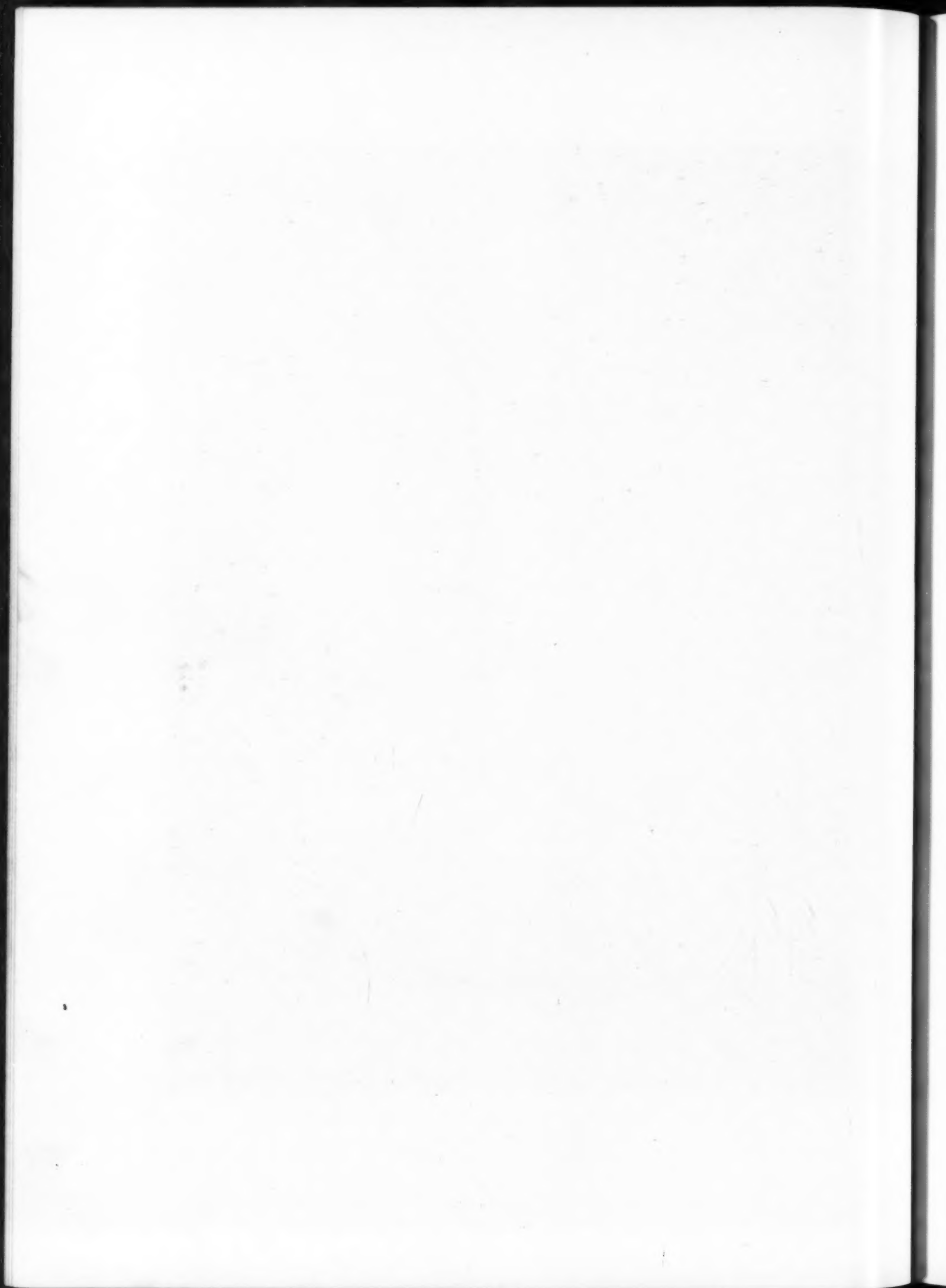


DETAIL, APARTMENT HOUSE, AMSTERDAM
S. DE KLERCK, ARCHITECT





DETAIL, APARTMENT HOUSE GROUP, AMSTERDAM
S. DE KLERCK, ARCHITECT

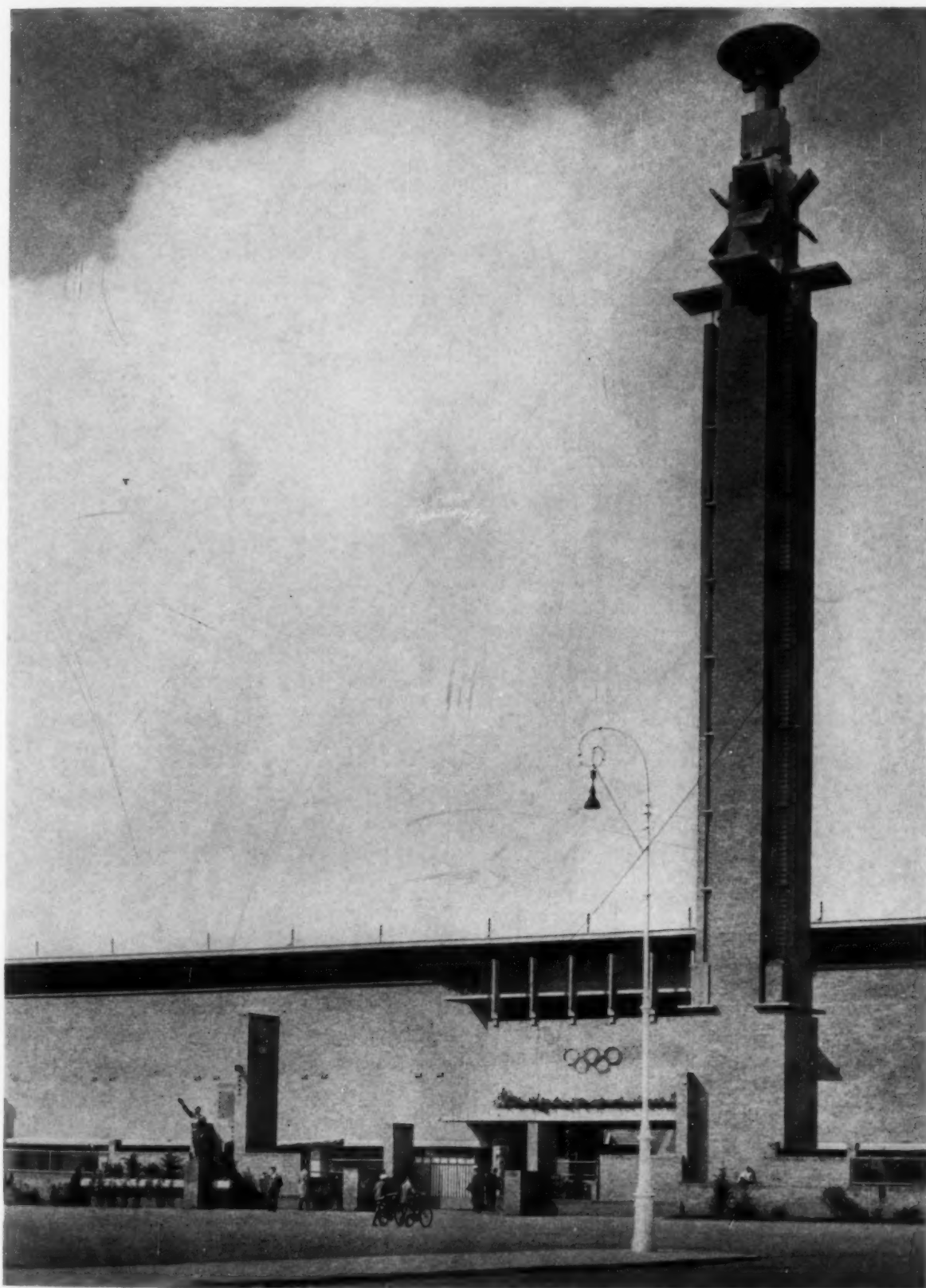




SCHOOL IN APARTMENT HOUSE GROUP, AMSTERDAM
S. DE KLERCK, ARCHITECT







OLYMPIC STADIUM, AMSTERDAM
JAN WILLS, ARCHITECT



THE REJUVENESCENCE OF WROUGHT IRON

PART TWO

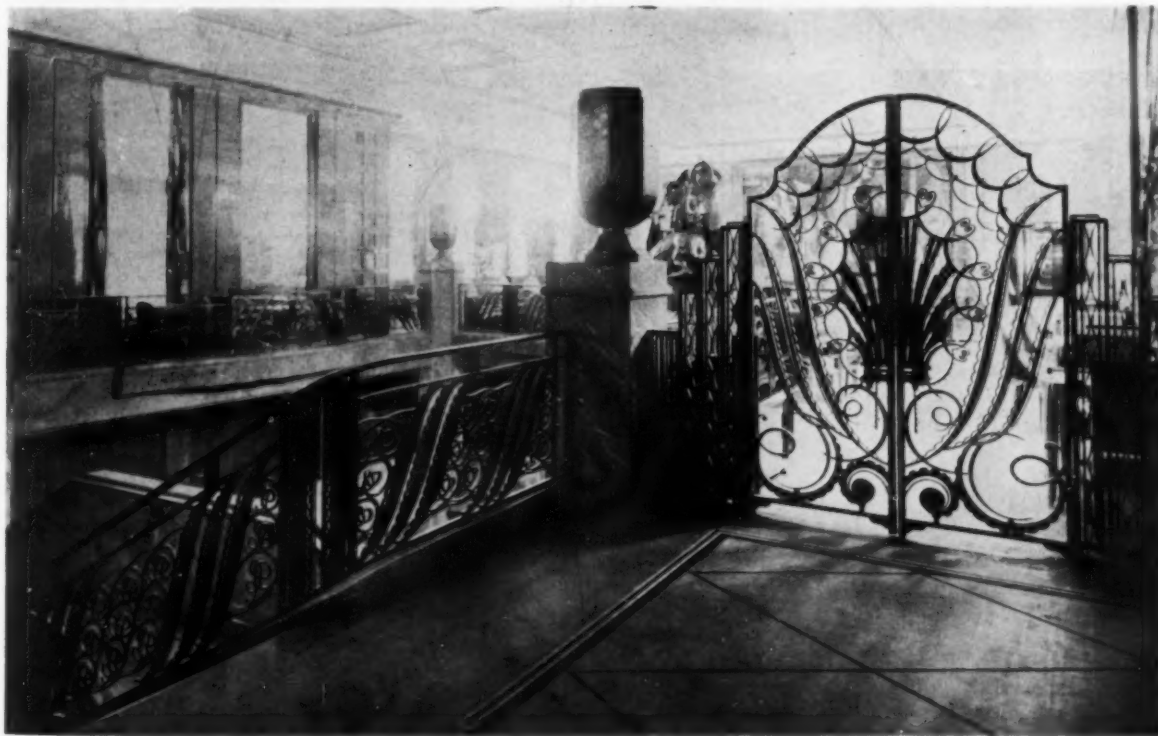
BY

W. FRANCKLYN PARIS

IN the January issue of *THE FORUM* something was said regarding the excellent metal work being produced by the French *ferronniers* and the striking beauty of many of the effects which they secure. One of these effects, which is of particular interest, is used by Brandt in many of his pieces where gold and silver contrasts are graded through oxidation as in the door, "*Les Cigognes*," where a Japanese flavor is imparted by three storks in flight, and the supple and pliant composition, "*Les Bouquets*," where light and shade effects are obtained by roughening some of the surfaces so that they may catch the light at certain angles. Where the door is to be exposed to the weather, Brandt's forge work is more massive, and the iron is allowed to show the marks of the hammer, as in one outer door in which pine needles and cones are used as a decorative motif. If the door's function is to be performed indoors, the metal is smooth and polished as in a dining room door picturing grapes clambering up a trellis. Brandt also executes designs commissioned by architects and decorators, and his role then becomes that of manufacturer, when credit or blame for the visual effect produced must proper-

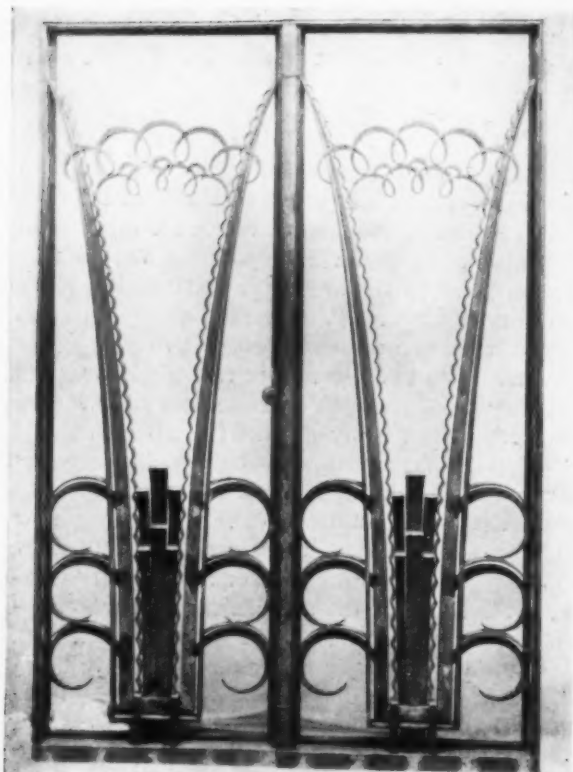
ly belong to the designer or the composer, and not to the *ferronnier*. The stair rail executed for Paul Poirer shows at once that it is not the brain child of Brandt. It is the conception of the famous brothers Perret, the architects of that ultra-modern church of Raincy, which created a sensation in the architectural world some five years ago. Messrs. A. and G. Perret are radicals in art, and in their warfare against tradition and routine they have committed many geometrical atrocities.

The public has been reproached so severely for having laughed or hissed in a few celebrated cases when it should not have done so, that it now maintains a prudent silence when confronted by hideous "art" committed under the alibi of "originality." Some of the modernists have taken advantage of this attitude of the general public and, —to use a picturesque colloquialism,—have "gotten away with murder." The theory that "loveliness needs not the foreign aid of ornament but is, when unadorned, adorned the most," is all very well, but when carried to extremes it yields an architecture of sharp angles, when packing cases piled one atop of another take the place of line, of balance and proportion, and where na-



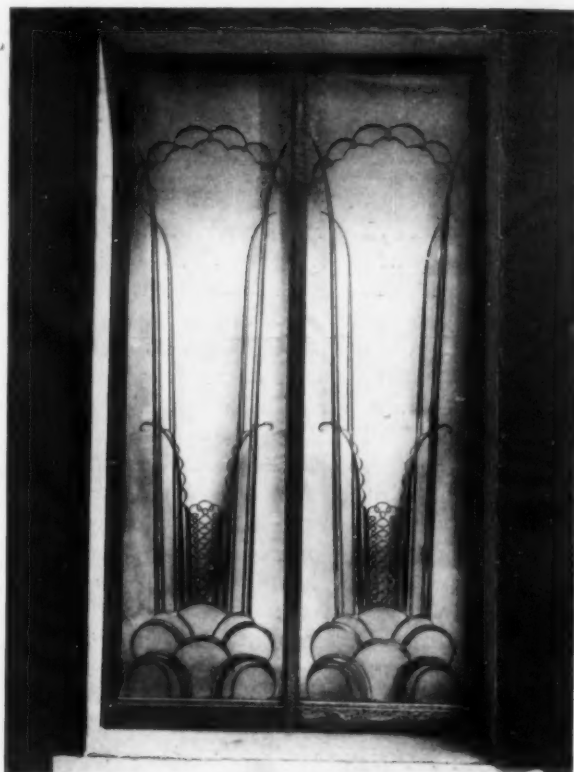
Rail and Gates, Grand Staircase, French Line S.S. "Ile de France"

Designed by Raymond Subes, R. Bouwens de Boijen, Architect



Gates, S.S. "Ile de France"

Designed by Raymond Subes. R. Bouwens de Boijen, Architect

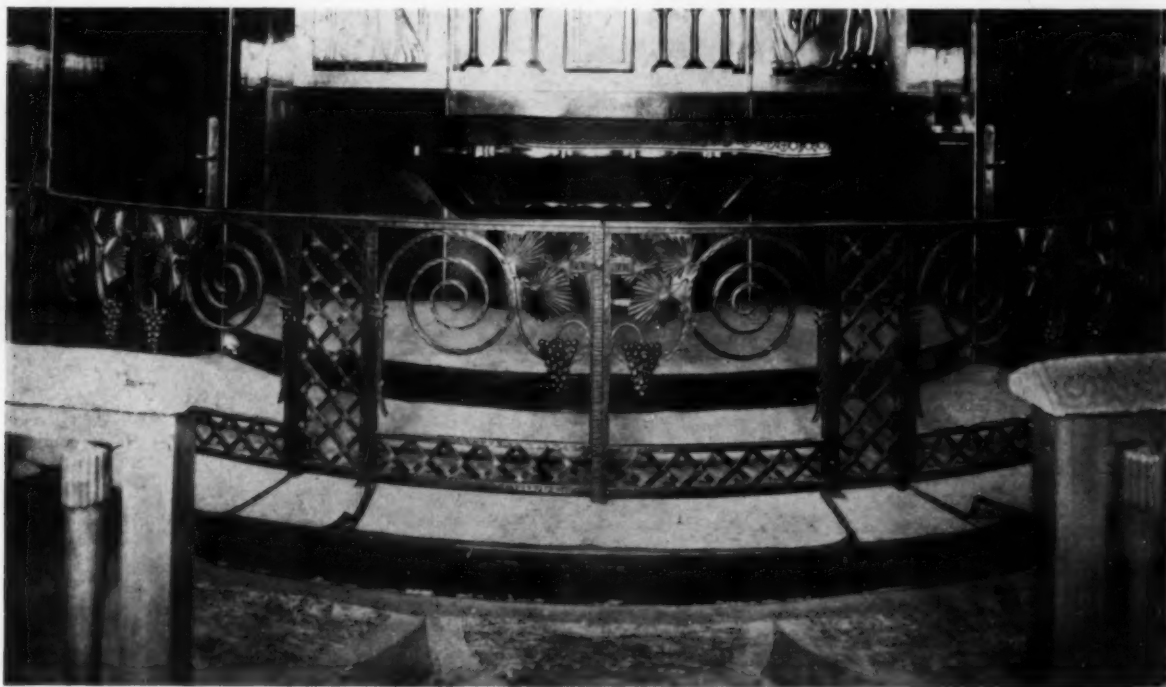


Grille Suggesting a Fountain

Designed and Executed by Raymond Subes

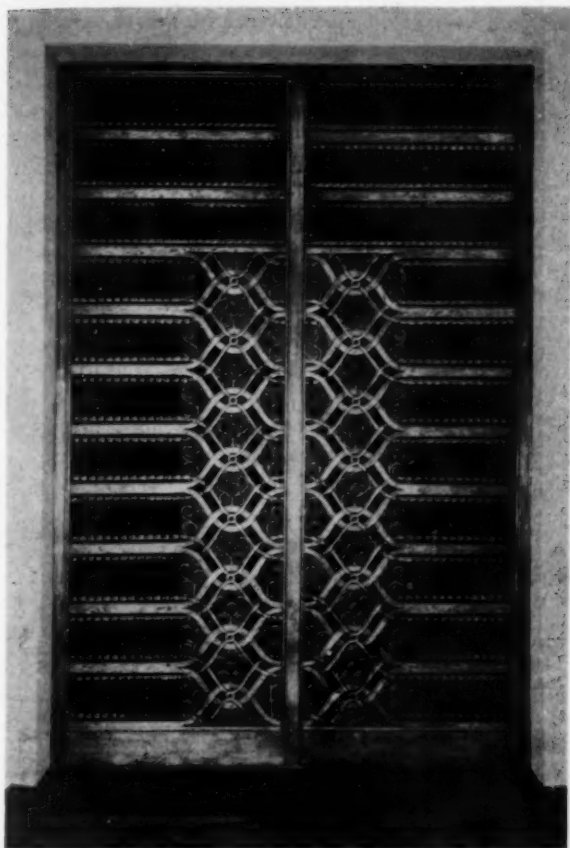
kedness without form and parading as simplicity vainly attempts to do to our emotions what may be attained only by golden visions and romantic

dreams. The Perrets and the Mallet-Stevens and other apostles of the straight line no longer make a noise when they explode, however, and

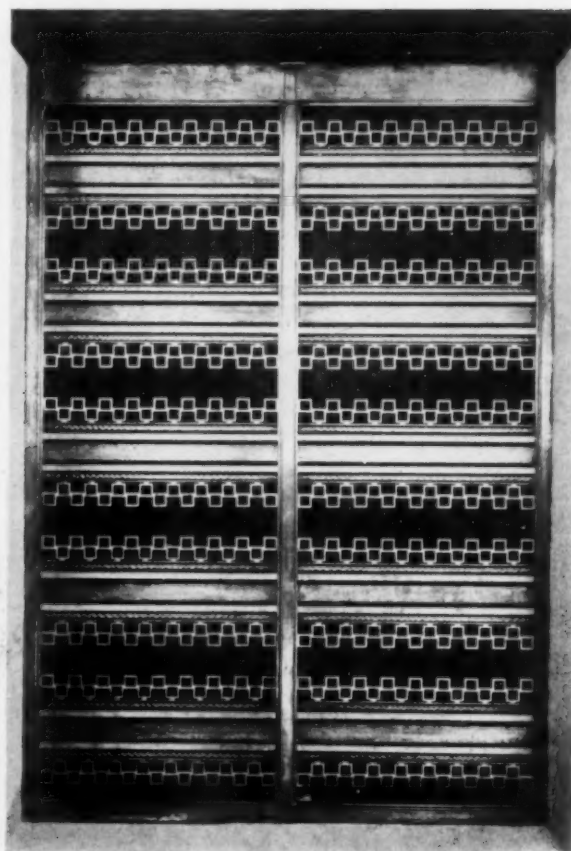


Communion Rail, Chapel on French Line S.S. "Ile de France"

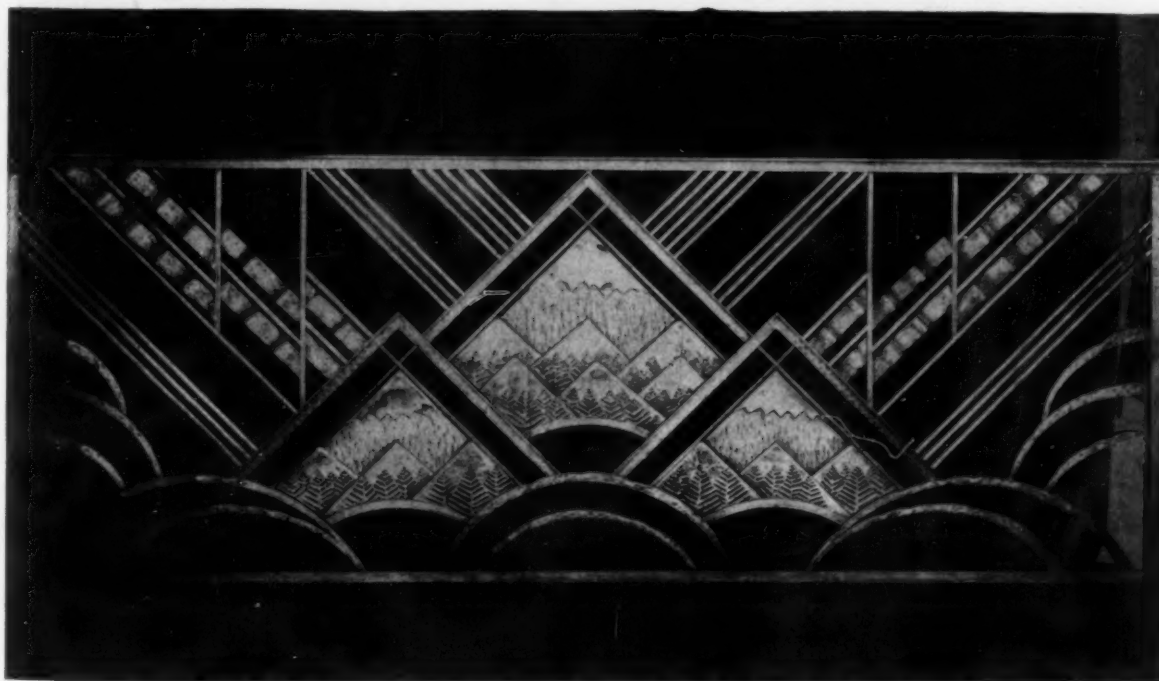
Designed by Raymond Subes. R. Bouwens de Boijen, Architect



GRILLE FROM SALON DES ARTISTES
DESIGNED BY RAYMOND SUBES
M. HENNEQUET, ARCHITECT



GRILLE IN BRONZE FOR DOORWAY
DESIGNED BY M. PATOUT, ARCHITECT
EXECUTED BY RAYMOND SUBES

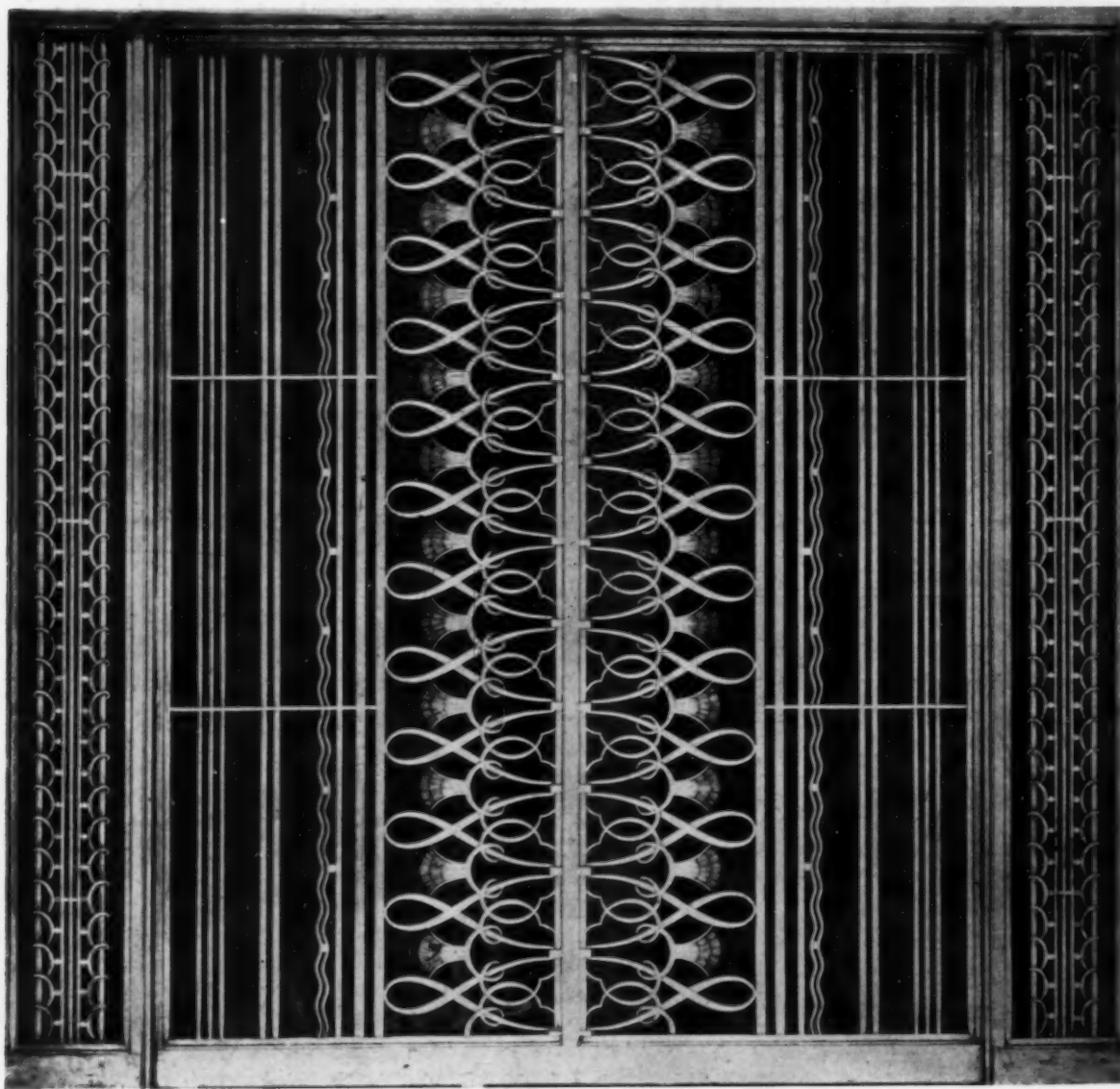


BALCONY RAILING FOR THE PARAMOUNT THEATER, PARIS
M. MORGEAND, ARCHITECT

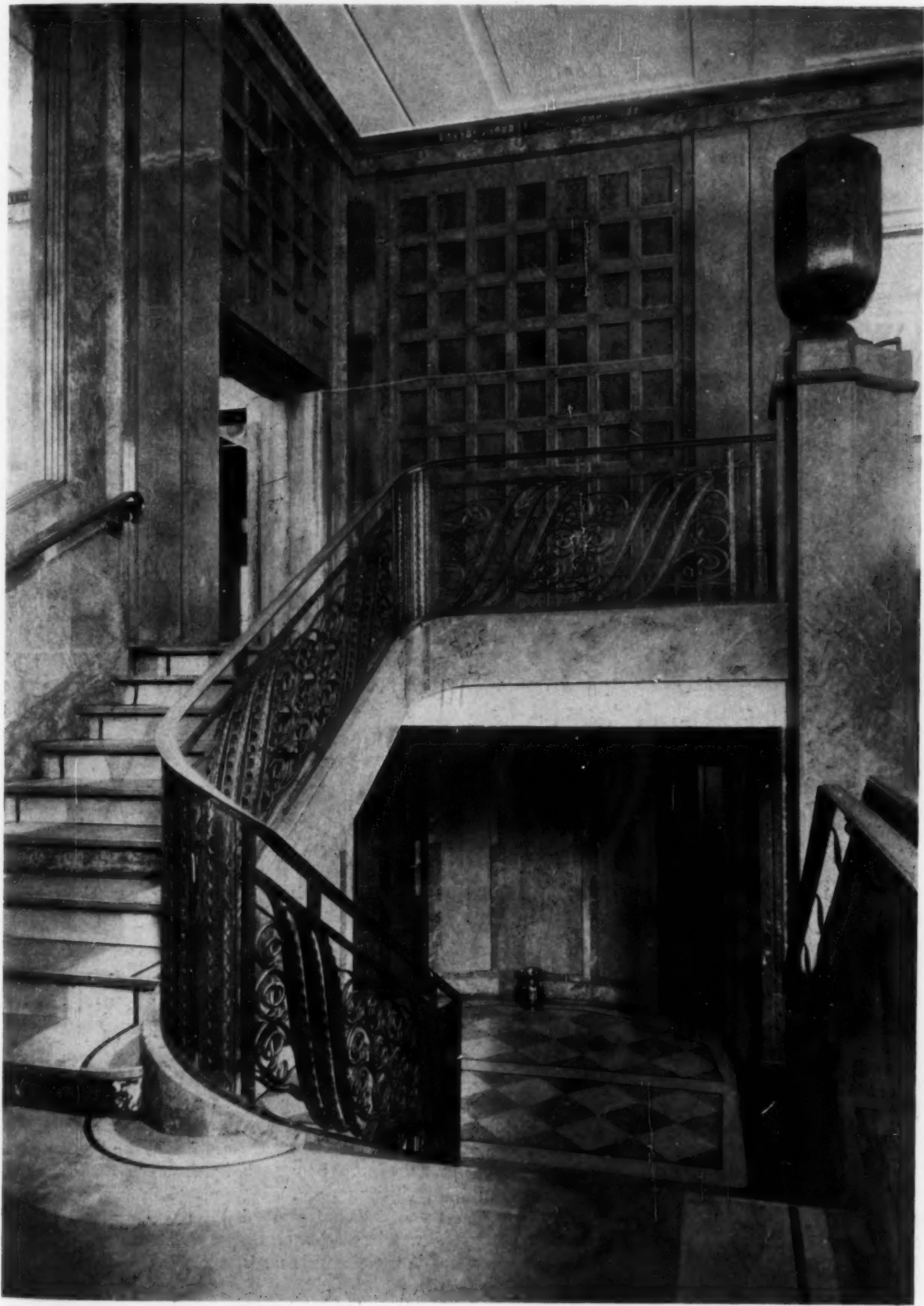
the extremists are all putting plenty of water into their wine. The tendency is still toward a virile style as contrasted with the effeminate expression prevalent under Louis XV, but as Nature has created very few square leaves on very few perfectly perpendicular trees, very few trapezoid men and women, and even fewer octagonal or rectangular clouds, the curve has come once more into favor. How much can be done with it, without abandoning the modern feeling, is exemplified in a baluster of wrought iron and bronze for a music room in Nice, where dancing figures are set in a delicate iron tracery of graceful volutes, and in an interior door, where conventional flowers are disposed in the intervals left by serpentine vines, crinkled and curly, all this in metal.

Space is lacking here in which to illustrate and analyze the work of all the *ferronniers* who are

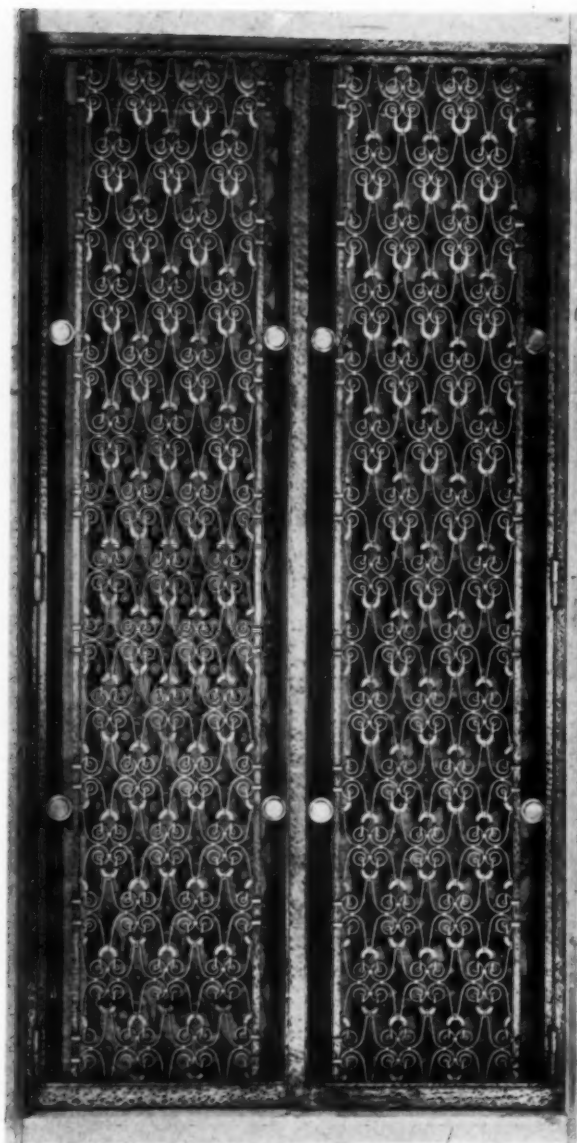
bringing fresh luster to the art of metal working in France, but in order to portray the diversity of expression that may exist among them, a few examples of the work of Raymond Subes may prove of value. Subes, like Brandt, is a disciple of Robert, but his mood is less sprightly than Brandt's, —more austere. He uses welding, but likes to leave on his metal the impress of the hammer. He seems to employ the modern technique with reluctance and to shun polished and finished effects. One of his latest productions, a balustrade for the Paramount Theater now being built in Paris, reflects his fondness for massive effects and rough surfaces. He is frequently employed to materialize the conceptions of others, but generally the architects who patronize him do so because they like his solidity of expression. Those who want delicacy or lightness generally commission Brandt



Grille Designed and Executed by Raymond Subes



STAIR RAIL, FRENCH LINE S.S. "ILE DE FRANCE"
DESIGNED BY RAYMOND SUBES. R. BOUWENS DE BOIJEN, ARCHITECT



Door Grille

Designed and Executed by Raymond Subes



Entrance Gates

Designed by Raymond Subes, M. Expert, Architect

or Szabo to express it for them. Subes is for severity, for *martele* effects, for straight lines and geometrical simplicity. His work on the French liner, *Ile de France*, shows that he can employ the sinuous when the occasion requires it. The S.S.S. motif utilized in the balustrade and stair rail is inspired by the undulating movement of the ocean wave. The swelling effect, the sweep of the sea, is well expressed. His treatment of the altar rail and grille to the chapel of the ship reveals his fondness for rough-hewn metal. Occasionally he forgets that *meuble* signifies "mobile," and some of his furniture is so ponderous as to be doomed to immobility. He is the perpetrator of a folding screen in metal, a *paravent*, literally, a shield against drafts, which not only keeps off the wind

but which could easily keep off the outpourings of a machine gun! Why a windshield should be made of armor plate is one of the mysteries of the age. It is so heavy that two strong men are needed to move it! Lest the reader be left with an impression of clumsiness and a feeling of mal-appropriate treatment, however, we illustrate an outer door in which are embodied the artist's mastery of the new technique and his feeling for curvilinear ornamentation. The framed panels are of opaque pressed glass, and the effect produced is festive and airy, appropriate to its use.

What the *feronniers* of France are doing in the lesser field of lamps and lighting fixtures, locks and door handles is just as admirable as what they are doing in the larger field of archi-



Grille

Designed and Executed by Raymond Subes



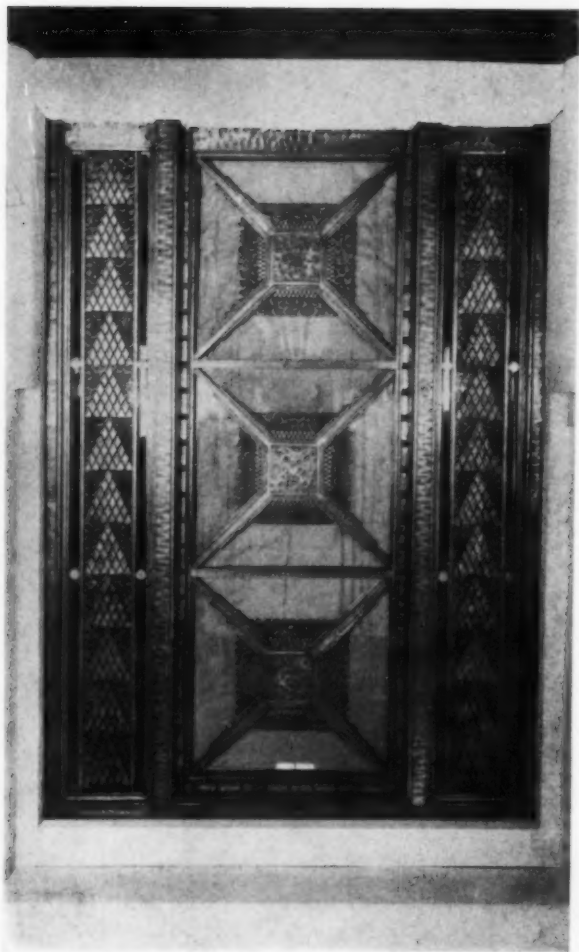
Gates

Designed and Executed by Edgar Brandt

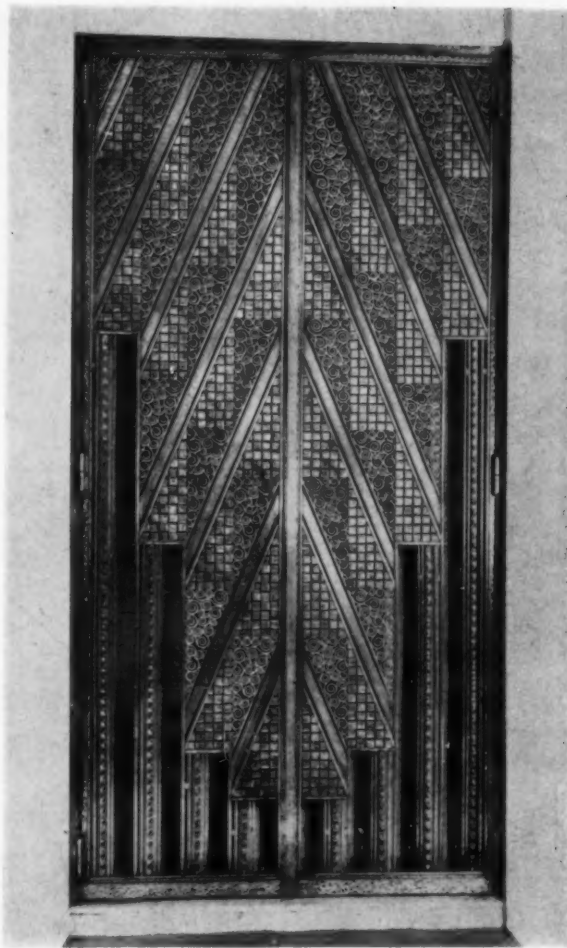
ture and the decoration of interiors. The lesson to be drawn is that in America, where building activity is greater, where new apartment houses and office buildings are springing up by the thousands to Europe's hundreds, the opportunity exists for a fine blossoming of metal ornamentation, opportunity much greater than that which prevails in France. There are no technical difficulties that our metallurgists cannot solve as well as the French technicians. There are no financial obstacles. The wealth is here, and if industrialists can be found to finance automobile plants, they should be found to finance ateliers of *ferronnerie*. The artists cannot do it alone; there must be co-operation with industry. More and more will we be concealing our prosaic radiators behind artistic wrought iron screens; perhaps some day we shall want an individual radio container of unique design made of metal, a cabinet in the lighter-than-aluminum alloy, of which the framework of Zepelins is made, that will have no duplicate. The caprice of women for "creations" in hats and gowns would be more plausible if expressed in a desire for the exclusive in mirror frames, consoles, telephone instruments, lamps and a score of personal objects with which they must live in intimate contact for years instead of for weeks or months. What church would not be embellished by having its organ pipes concealed behind a state-

ly wrought iron screen, or a bronze and copper grille with sculptured figures set in, as in Brandt's "Age d'Or" gate? Think of all the elevator cages, the shop window back drops, the porch balusters that could have individuality. What Daniel Chester French and Andrew O'Connor did in stone for the portico of St. Bartholomew's, some *ferronnier* can do in metal for the entrance to a bank or a hotel. The Fifth Avenue shop that would have a personal, unique, exclusive, distinctive, wrought iron screen against which to display its wares, would acquire a certain individuality.

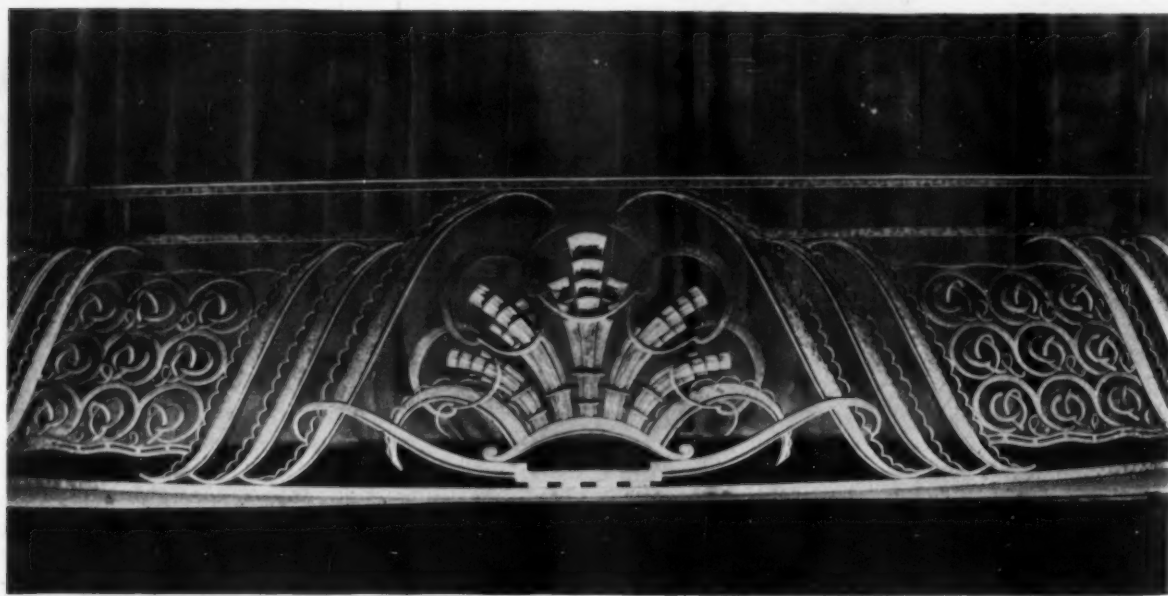
The possibilities are endless. Perhaps we have not the craftsmen-artists to execute all the work that might reasonably be expected. We have, however, able architects and artistic designers in whom the sense of ornament is highly developed who could draw cartoons for execution by the *ferronniers*. The limitations to expression in metal have been removed. The time element no longer exists. Almost anyone with a sense of proportion and an eye for beauty can design a pattern that will be translatable into iron, if he will observe the rule of fitness to purpose. There are nameless graces which no methods teach, but where the will exists a way is generally found. The hour is propitious for the flowering of *ferronnerie* in America if desire for this blossoming is given expression by architects and decorators.



DOOR FROM THE SALON DES ARTISTES
DESIGNED AND EXECUTED BY RAYMOND SUBES



UNUSUAL BRONZE DOOR GRILLE
DESIGNED AND EXECUTED BY RAYMOND SUBES



DETAIL OF THE STAIR RAIL, FRENCH LINE, S.S. "ILE DE FRANCE"
DESIGNED AND EXECUTED BY RAYMOND SUBES

THE BAGATELLE

BY

KATHARINE STANLEY-BROWN

WE pass the marvelous iron grille whose black curves throw wavering shadows across the sun-streaked lawn, pass the gay little pavilion (can one believe it ever housed anything as prosaic as a guard?) and are in the gardens of the *Bagatelle*, gardens that, filled as they are now with riotous children and toddling babies, seem never to have lost their dignity and their stately grace, which, with a touch of irrepressible gaiety as well, was their legacy from the eighteenth century. The path meanders past tall oaks, trees of boxwood trained into unusual shapes, lindens with mossy trunks, and pink horse chestnuts, and where the ground is bare beneath the shadows, glossy ivy clusters in wide circles. We pass a little gate, a broken tower, and a stone door with some carving of the thirteenth century. They are all incidental in the gardens, like the grotto of the philosopher, the tall and rather grotesque water tower, the arched bridges over infinitesimal pools, surprises for the eye, fabrications which by their very artificiality cast a wider dignity upon the giant oaks and the quiet lawns. The path winds past the stables, no longer used for horses, but transformed now into a chic little tea house, *La Rose-raie*, where, while one eats ices and munches *petits-fours*, the eye is constantly delighted by the gardens beyond. The end of the *orangerie* is visible, as is also the tiny picking garden, outlined by hedges lower than the general level of the grounds, whose ascending steps are marked by sky blue Italian pots full of passion flowers. The drinking fountains beside the stable doors have undergone a transformation also. They are filled with petunias, which blow softly back and forth in the gentle August breeze.

Summer in France! Delicious, sun-filled air drifting lightly past one, great bundles of white clouds in the blue clear sky above, and the *Bagatelle*, that charming plaything of the eighteenth century, which remains untouched, delicate and rare, in the midst of its gorgeous gardens. That tiny, buff colored chateau, its windows gay with overhanging white swags of fruit and flowers, seems just the building to find in the midst of so much beauty, just the plaything to expect. It is approached formally. Two small square gate houses, one boasting a clock, the other a compass, open upon a graveled court of honor. Between the little buildings two tall horse chestnuts rise by intention or training to exactly the same height. Terraces extend around the court of honor, their low walls with their ivy-covered windows concealing rooms approached on a lower

level, where domestics could be housed. On the right of the court is the little museum, built in the nineteenth century, but, charming as it is, we scarcely notice it, for at the end of the graveled stretch, square and shining in the sun, is the delicious, symmetrical, charming facade of the *Bagatelle*. The entrance doorway is flanked with pink marble pillars, the iron railing above is a miracle of design. High up on the facade the words *Parva sed Apta* are painted in gold across a black band. "Little but just right," it might be freely translated, remembering Peter Ibbetson and his beautiful little Mimsey Seraskier who lived in a house of that name. The two wings adjoining the central pavilion are scarcely wider than their single windows, and the whole building is crowned with the most charming copper dome, rising in shell-like form to a crest, a circle of swags and lions' heads. A tiny flag-pole rises from the center of this dome. Does it fly a pennant sometimes with the *fleur-de-lis* of France, I wonder? It would seem appropriate to find the colors royal here. For it is just the resting place for a queen, that queen whose tiny feet had led her through a life which knew naught save "*l'élégance, l'amour, le chic*." To take her through her last months, to behead her, these indeed were inappropriate gestures, sufficiently cruel for those of lesser clay. It was to rest her, to please her, that the *Bagatelle* was built.

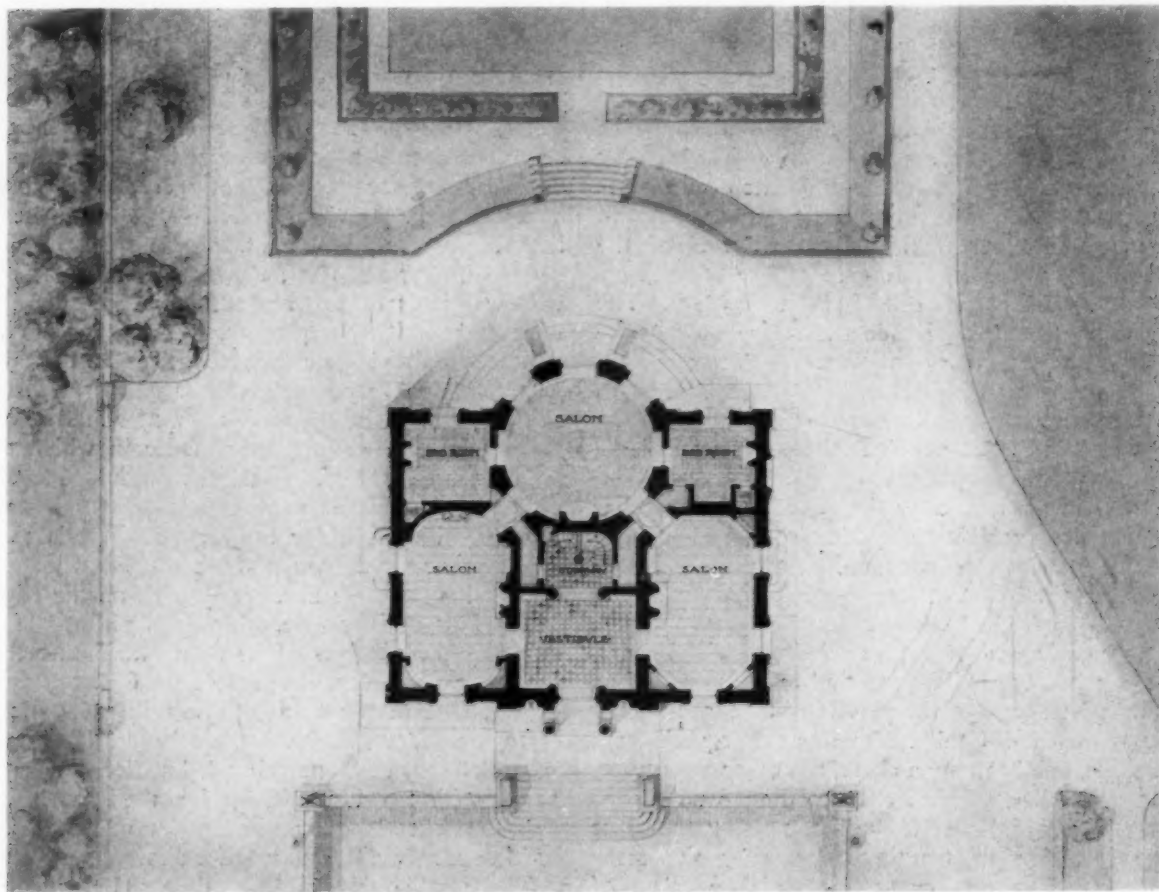
On October 22, 1777, the Comte d'Artois, he who was later to be Charles X, wagered a million francs with his pretty sister-in-law, Marie Antoinette, that before she returned from Choisy, where they were residing, to her palace at Versailles, just nine weeks from then, he would offer her a perfect little gem of a house in which to break her journey. The queen, incredulous, took up the bet. Indeed, and who would not? Sixty-four days! She knew the Comte d'Artois had recently bought the *Bagniole*, a dilapidated little thatched roof house in a lovely park on the edge of the Bois de Boulogne, which, though made famous by the excesses of its occupants under the Duchesse d'Estrees, the Prince de Chimay, and others, had been allowed to fall into complete disrepair. But that he, a mere lad of 17, could rebuild this, not alone rebuild, but decorate and furnish it and make it fit for the Queen of France to spend the night in, was incredible. And in 64 days! She had no worries about her wager!

The Comte d'Artois lost no time. He made his bet on the 22nd of October. On the morning of the next day 900 men were assembled and ready

to start work on his *casin* as he called it, or little house. As the workmen hammered and sawed, the Comte's friends assembled on the terrace to see the marvel grow. He pointed his cane at it, and laughed: "It's nothing, a mere *bagatelle*!" and the name has clung to it ever since. His architect, Belanger, a great favorite at court, the originator of a thousand royal fetes and spectacles, fell into the spirit of the scheme at once,—something rare, something tiny, and yet not too gorgeous for its rural setting. He laid out his plans, and surrounded himself with artists. Dus-saulx came to paint arabesques on the delicate white and gold panels of the tiny rooms; L'Huil-lier's chisel rang as the nymphs and sphinxes took their places; Gouthiere contributed ten charming fireplaces with mantels in marble and bronze, long since celebrated. A Scotch gardener, Blaikie, laid out the lawns and pools and copses after the English fashion, but he coöperated with the French gardener, Chalgrin, to the extent of accepting his extraordinary suggestion that they plan the vistas after some of Hubert Robert's pictures. Chalgrin planned too the formal oblong garden plot behind the house. Its delicious

straight lines of roses and tall leaden jars lead beautifully from the terrace with its sphinxes and cupids toward the willfulness of the pools and grottos and lawns beyond. All this was most expensive and most difficult to arrange, but the Comte's mind and heart were set on winning his wager and achieving his "bibelot." He resorted to strategy, certainly strategy not admirable even in those less circumscribed days. Not being able to secure enough of the necessary building materials, he ordered regiments of Swiss guards to station themselves at the gates of Paris and seize whatever came in that might be of use to them. To be sure the material was paid for on the spot, but as it had already been paid for in other quarters and naturally had its own destination, the complications were immense. However, nothing daunted the Comte, who ordered the laborers to work in shifts both day and night, so that in exactly nine weeks the *Bagatelle* was completed. To be sure it cost the Comte three million francs, but he had the queen's million, lost on her wager, to help him with the debt.

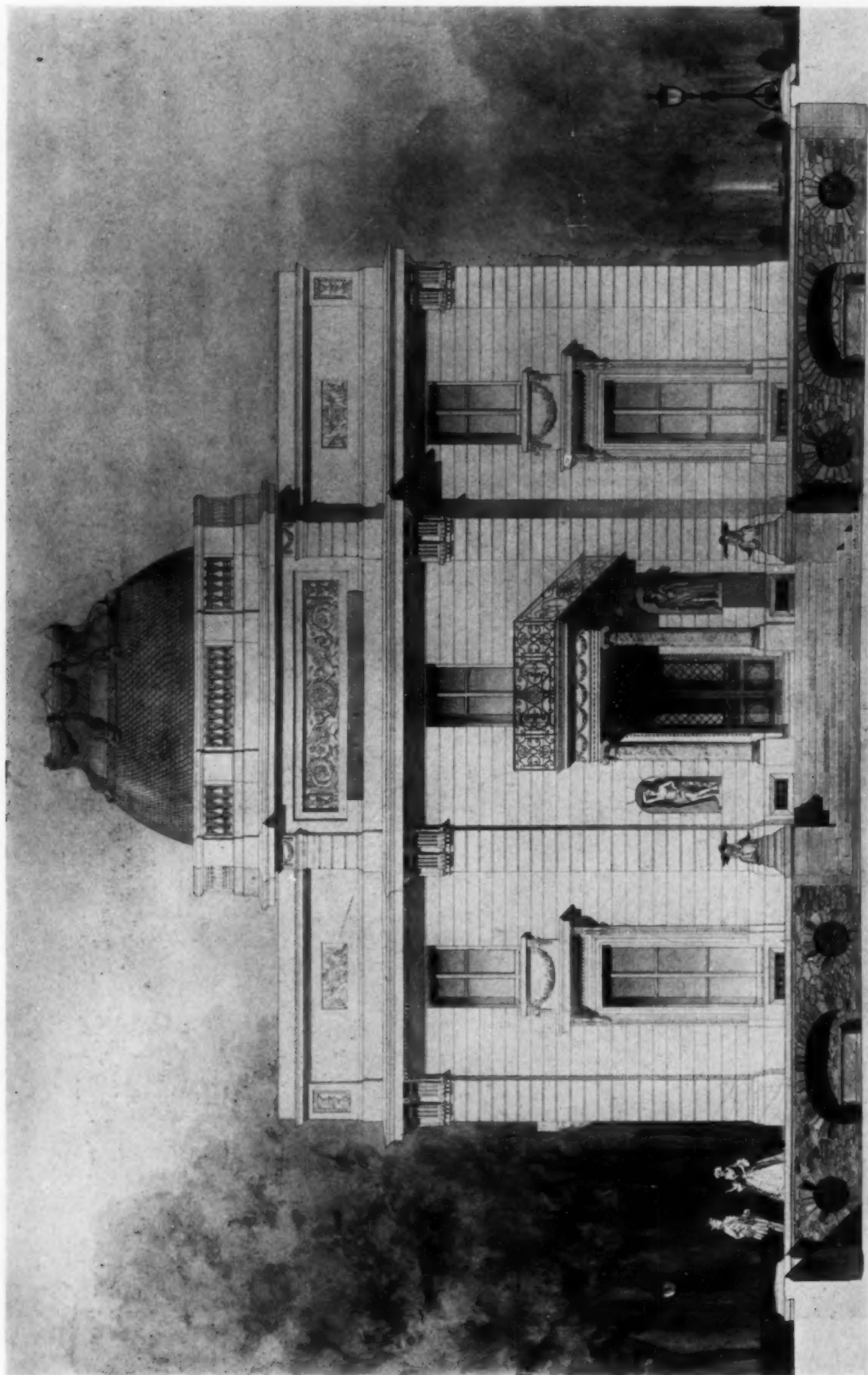
The *Bagatelle* was complete, the wager won, but sickness and mourning at court delayed the visit



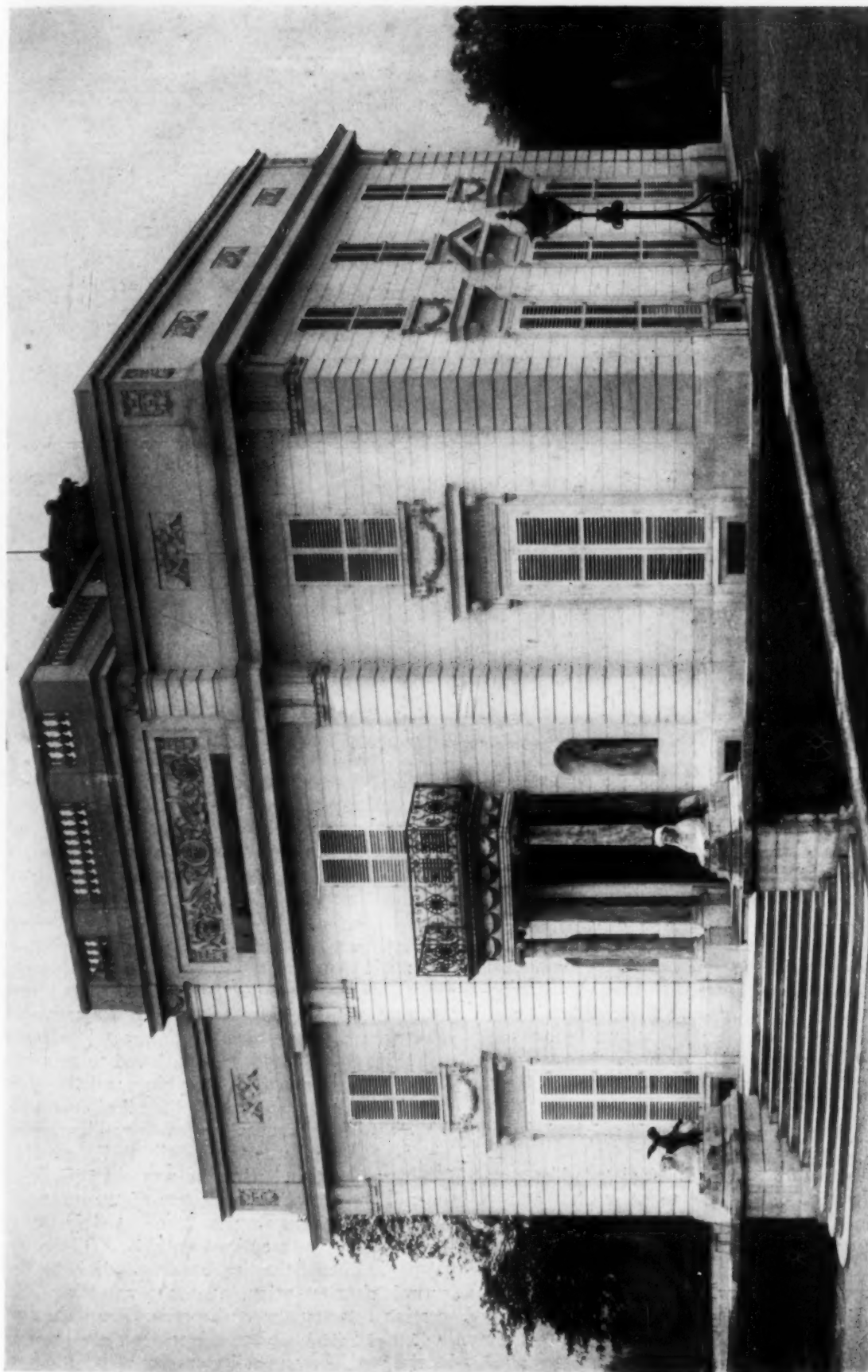
Plan of Ground Floor, the Bagatelle, Paris
F. J. Belanger, Architect
From a Drawing by Rudolph Stanley-Brown



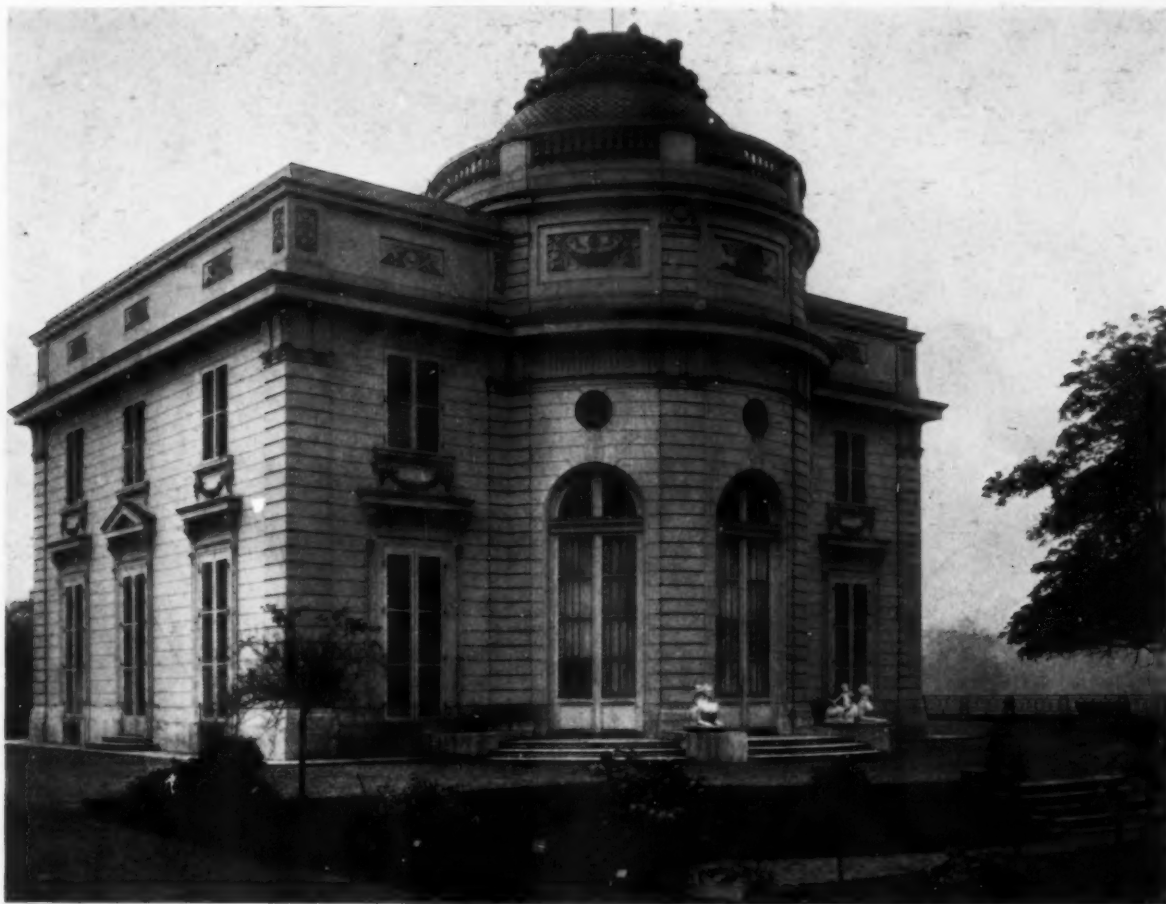
MAIN FACADE, THE BAGATELLE, PARIS
F. J. BELANGER, ARCHITECT



THE BAGATELLE, PARIS
F. J. BELANGER, ARCHITECT
FROM A RENDERED DRAWING BY RUDOLPH STANLEY-BROWN



MAIN FACADE, THE BAGATELLE, PARIS
F. J. BELANGER, ARCHITECT



East Facade of the Bagatelle

of the queen until May, 1778. On the 23rd of that month the Comte d'Artois offered the Queen Marie Antoinette a fete, "Rose and Colas," an opera-comique by Sedaine to be given in the gardens of the *Bagatelle*. Members of the court took part, and the queen herself impersonated a lady's maid. At one point in the progress of the piece, when there was a slight hesitation at the end of a speech by the queen, a whistle was heard. The queen, glancing toward the king, and recognizing him as the disturber, advanced to the edge of the stage, addressing him thus: "Monsieur, since you do not approve of my acting, will you not have the kindness to depart? They will give you back your money at the gate." The king, the chronicles read, was ashamed of himself, and demanded her pardon.

The Revolution struck the *Bagatelle* like a cyclone, as it so cruelly did to so much that was lovely in France. The statues were broken, the paintings and friezes were defaced, the gardens trampled upon. The methods of the Comte d'Artois, flown to Turin to save his own skin, had had too much publicity. His *folie* was not allowed to escape. Soldiers camped on the grounds, rare plants were dug up and removed,

and the estate was decreed by the convention to be a public playground, a *place pour les jouissances du peuple*. The château itself by 1806 had degenerated into a mediocre cabaret. In June of the same year, however, the Emperor Napoleon, installing law and order in his triumphant wake, bought the *Bagatelle* for 321,206 francs, "which includes the mirrors and the chandeliers." Napoleon made many necessary repairs, filled the forest with game and deer, and in the next few years dined there often or attended the carefully selected receptions which the Empress Josephine, assisted by her friend Tallien, loved to arrange. With the banishment of Josephine, and the arrival of Marie Louise and the little *Roi de Rome*, the *Bagatelle* became almost a "royal" nursery. The adored child was taken daily to the gardens for his airings, and when he was old enough to walk, he promenaded the length of the court between rows of guards who stood at rigid attention while he pattered innocently by. There too it was, in one of the tiny boudoirs adjoining the central circular salon, that the affecting first meeting between the ex-Empress Josephine and the little *roi* took place. Napoleon and Marie-Louise could fear no evil from one who had loved



Gate of Honor and Entrance Pavilion, the Bagatelle

and suffered as had Josephine. They granted her request to see this baby of 19 months, of whom she herself in the days when she was Napoleon's wife had so prayed to be the mother. So the meeting was arranged to take place at the *Bagatelle*. The records say that she entered, "all trembling with emotion," and kneeling before the imperial infant, who lay across the knees of the Comtesse de Montesquieu, his governess, "tenderly and longingly kissed his tiny hands and golden curls, then rushed from the room in sobs."

At the return of the Bourbons, the *Bagatelle* was given to the Duc de Berry, in whose hands it became a hunting lodge popular among the courtiers of the restoration. A card still exists inviting a guest to hunt: "Monsieur the Duke of Berry will hunt the fallow-deer in the Bois de Boulogne the tenth of this month. M. is invited by His Royal Highness to present himself at the *Bagatelle* and partake of refreshments after the hunt. Signed, Comte de Nantouillet. (The breakfast will be at ten hours and a half.)"

In 1835 the *Bagatelle* came into the possession of a rich Englishman, Richard Seymour, the Marquis of Hertford, who in the years that followed restored it, not into its original form, which was literally impossible, but into a gracious and beautiful dwelling place. Augustin and the brothers

Adam were brought in to decorate the boudoir panels, of which the original paintings had been executed by Dussaulx and Dugourre. The rooms were embellished with pictures, vases, and objects of rare workmanship; 150,000 square metres were added to the property, the *orangerie* was built, and all was in perfect order when the first important visitor, Queen Victoria, arrived. The art collection eventually became so vast that when, on the death of his illustrious father, Lord Wallace received the *Bagatelle* as part of his inheritance, he found it necessary to construct the little museum at the right of the court to contain it. Again the circular salon, the tiny boudoirs, the dining room and the billiard room were restored to their shining gold and white simplicity. Lord Wallace's decorators removed all art works of inappropriate periods, and when after his death the French government bought the *Bagatelle*, it acquired as perfect an example of the style of the period of Louis XVI as is to be found in France. The swags, the wreaths, the designs in general have that tendency toward the purer Italian Renaissance forms which is found throughout France in the work of this period. Only in the fireplaces, charming in design and symbolism as they are, do we feel some lingerings of the Baroque and the heavier style of the period



The Grand Salon of the Bagatelle

just over. The handles and the hinges of gilt bronze are all delicate and true to the time, as are also the checker-board marble floors, the hanging staircase, and the white and gold panels picked out in color. The stone sphinxes that guard the doors are charming reminders of the eighteenth century. Their lions' flanks are draped with elaborate covers, and their women's heads are adorned with what appear to be curled and powdered wigs. On their backs alight, for an instant it seems, puzzled and decorative cupids whose hands caress the anomalies beneath them.

In the formal garden, too, are small cupids astride high leaden jars. Impudently, chin in hand, they stare across their vases at each other. The garden's oblong space is edged with rows of flowers. Pink, red and white geraniums mingle in charming complexity. The little standard rose trees that rise from the central beds open red, magenta, or yellow petals to the August sun. It is indifferent to the gardeners of the *Bagatelle* what colors may blend or not blend. The effect is riotous, elegant, charming, in fact exactly the note to have been struck in an eighteenth century garden. The colors from the lily pond beyond are gorgeous also. Across the pool there is a

stone grotto where water drips from cool, mysterious little crevices, while in the foreground are all the varieties of water lilies. Exotic and colorful, they line the edge. Even the labels giving their names, a legacy from the naturalist, Monsieur Gravereau, who made the gardens of the *Bagatelle* after the government acquired them into a veritable floral fairy land, are inspiring: *Somptosa, Virginalis, Vesuve, Hermine, Superbe*.

The gate lodge clock clangs a leaden double note. Sixteen hours. The good *bourgeois* droop in their seats. The children watch the gold fish which alternately loiter and dart about the garden pool. Shadows crawl across the lawn. The tiny round pavilion, whose latticed arches are filled with glass, catches some glints of the falling sun. It is just large enough to accommodate a tea table for two. How Count Fersen, who died to save her pretty head, would have loved to sit here and pour the tea in his queen's exquisite cup! The *fleur-de-lis*, the crown, the initials of the queen would all have been on that cup, made in Sevres, perhaps, a half-mile down the river. How the lackeys and the waiting maids must have rushed to unpack the queen's boxes! The coach, rattling into the court, waiting while out they tumbled.

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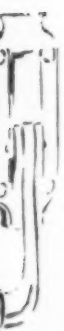
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WINTER CONSTRUCTION

From a Photograph by Leicester K. Davis

The Architectural Forum



THE ARCHITECTURAL FORUM

VOLUME L

FEBRUARY 1929

NUMBER TWO



THE ARCHITECT'S PART IN WINTER CONSTRUCTION

BY

LEICESTER K. DAVIS

UNTIL within recent years the architectural profession has not had to be greatly concerned with the difficulties of winter construction. In the past such things were mostly handled "on the job," and when beyond control, they commanded the situation until activities might be resumed in accordance with the specifications.

When, for example, a February blizzard howled or "the bottom dropped out of the thermometer," contractors and craftsmen grumbled, did what was reasonably within their powers, or "quit cold." Even though graphs of winter progress produced the peaks and valleys of a typhoid fever chart, hardship and setback were accepted as necessary evils of the season. Laborers, skilled workers, and makers of building supplies alike made the best of prolonged periods of idleness and reduced or glutted output. It was a state of affairs that easily might have continued indefinitely had not the coming of present-day building programs demanded that such limitation cease. Year-round, winter-through, construction suddenly became imperative, with progress to be unhindered by so much as a day's lost time. The problem of beating the weather at its game, of carrying on from fall to spring, has brought forth the best in architectural, engineering and financial thought.

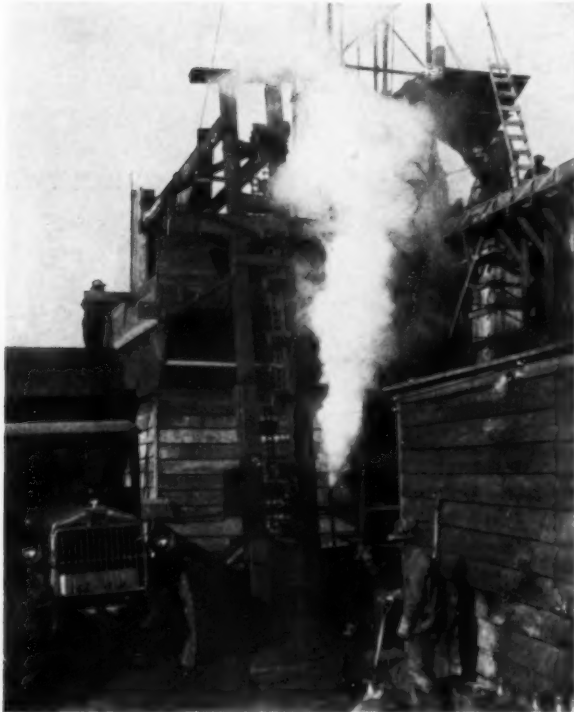
The extent to which he shall play his part in aiding winter construction schedules is something that every architect wishes to have well settled. It may be safely assumed that an architect appreciates the need of being adequately informed and fortified by data concerning all conditions, actual and potential, to be faced in the execution of his designs during the winter period. It is also taken for granted that the facts he obtains shall be complete and authoritative, of the kind prepared for dissemination by building congresses and other cooperative agencies in many of our cities lying within the "frost belt." This material is inval-

uable for use in preliminary conferences with owners and investors, to support the claims that winter work need not be retarded, and that the extra costs of taking precautionary methods are in most cases more than offset by reductions which contractors figure in their estimates at a time of year when there is risk of having to drop skilled craftsmen from the payrolls and pare down inactive organizations.

Experienced architects do not have to be reminded of the things that may follow on the heels of winter unpreparedness. There are the material faults induced by freezing temperatures, snow, ice and sleet. There is the likelihood of there being work that must come down, or be done over, or be partially replaced. There is the interest that must be charged against spoiling material, and costs chargeable to delayed schedules. And, finally, there is the inevitable result of all these things, strain of the relations between the owner, the architect, and the contractor.

Responsibility in Winter Construction

Causes and their effects are not, however, the sole concern of the architect dealing with winter problems. What he desires most is assurance of there being the proper preventives of winter ills and the effectiveness resulting from their employment. How, he asks, can he and his specifications aid best in keeping the winter program unbroken and at high level . . . how far should he and his specifications go? Logically, the question divides itself into several considerations. Theoretically at least, architectural specifications must be complete in their coverage of materials, means, methods, and results. The specifications are most emphatic as to results and the standards by which they are to be judged. But as to exactness in method and procedure, it has been held that such are without the province of strict architectural



Winter Equipment on this Construction Includes Pre-warming Stations. Material is Sifted by Gravity over Perforated Steam Coils which Give it Correct Temperature Before Going to the Mixers

preference and requirement, things with which experienced contractors, and they alone, should deal. And it is this viewpoint, as regards precautionary methods for winter work, that the architect is considering while plotting his position.

Investigation indicates that there is pretty general agreement between architects and contractors on essential points. Summed up they seem to be:

First: All specifications should include clauses obligating employment of the newest and most approved methods designed to insure correct performance under winter conditions surrounding particular phases of work in hand. Even though the construction schedule be planned to avoid winter work, this is a most advisable provision. Any one of several unforeseen delays may carry completion dates into the winter season, a possibility which, no matter how remote, should be prepared for in an adequate manner.

Second: Only contractors of known ability in handling work of the type required by the design should be considered as bidders.

Third: There should be a thorough understanding on the part of the architect or his representative of all problems likely to be encountered by winter construction within the locality where erection is to take place, as well as of methods best



Anti-freezing Compounds and Adequate Cold Weather Precautions Required by the Specifications Permit the Maintenance of High Standards of Craftsmanship and Unchecked Progress

suited to local conditions in meeting the problems.

Fourth: There should be thorough and frequent architectural contacts with all stages of winter construction.

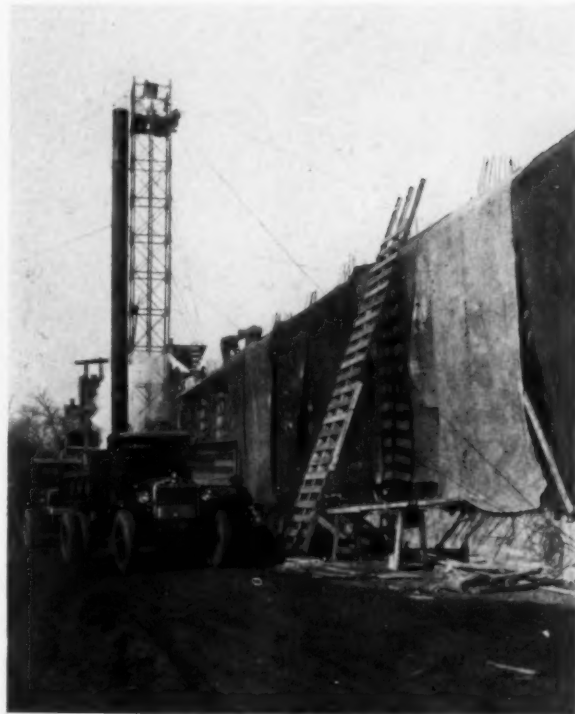
Fifth: There should be complete coördination, particularly on large-sized projects, between the architect or his representative and the contractor, in handling unforeseen exigencies.

Sixth: Separate contractual provisions should be attached to, or made a part of, the general contract, permitting immediate use of whatever temporary or auxiliary apparatus and material may be necessary for the control of winter emergencies.

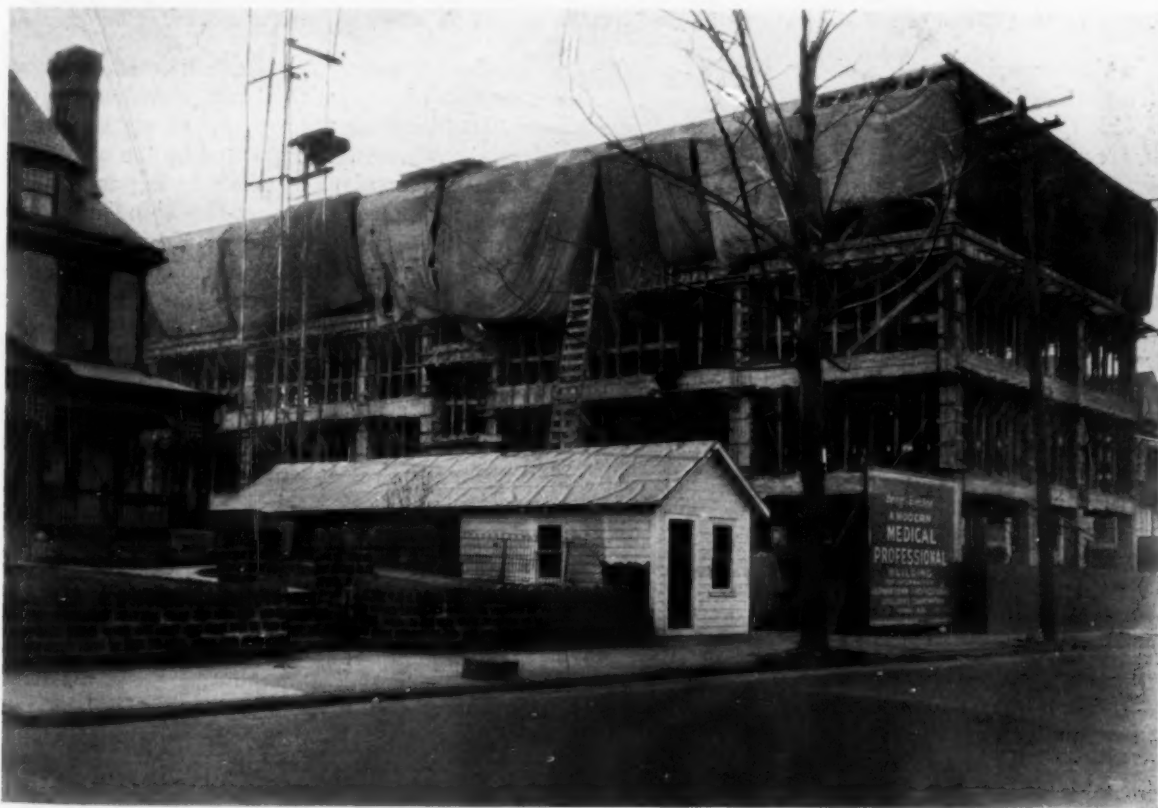
Seventh: Sub-contractors should be informed as to winter conditions likely to be encountered, in order to provide safeguards and figure them within their estimates.

Eighth: Progress reports and conferences should be made requirements of the specifications by special clauses describing their purpose, at what stages of the work they shall be submitted or held, and the type of information they shall present for discussion, approval, or criticism.

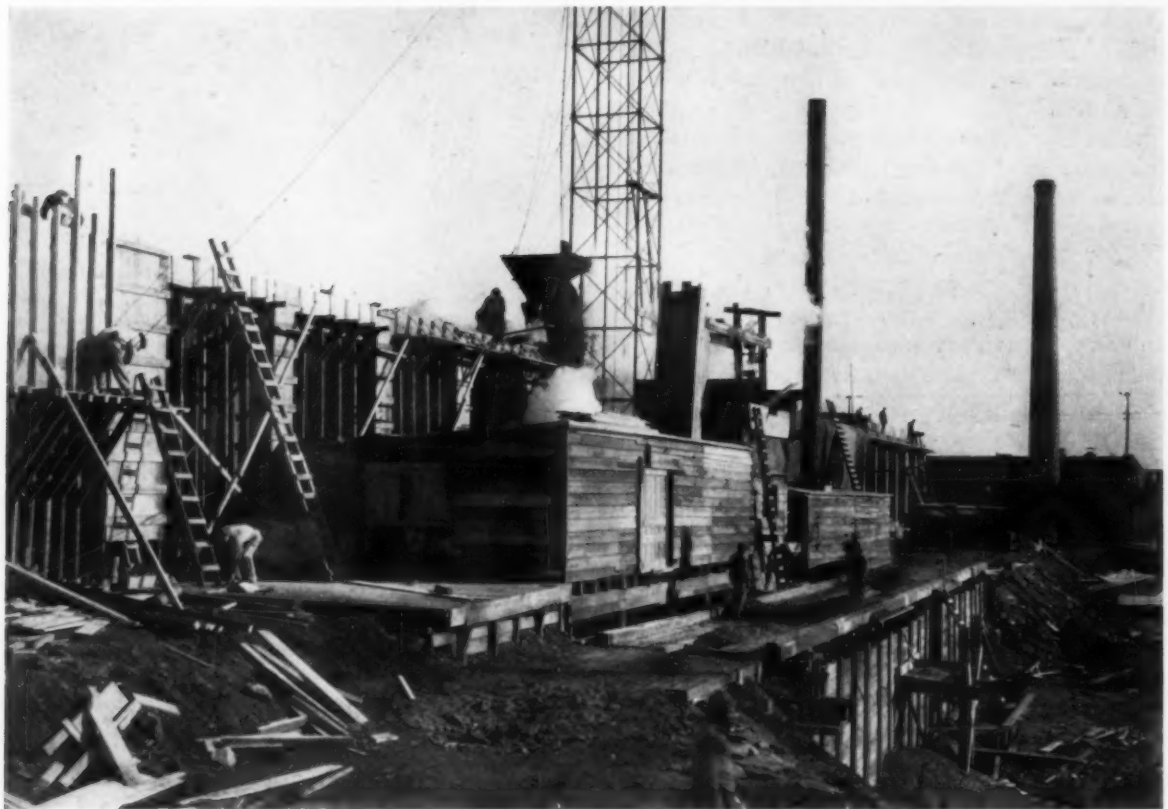
Ninth: There should be effective use of established and current data available through building congresses, associations, and other reliable agencies which act as clearing houses of informa-



Tarpaulin Coverage for Openings and for Freshly Poured Concrete Wall and Floor Forms is Essential Until the "Set of the Mix" Has Passed all Danger from Freezing Temperatures



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December Construction Scheduled for May Completion. Material Pre-warming Station, with Form-builders Keeping Ahead of the Mixers. At extreme Right Tarpaulins are Going up on Freshly Poured Forms

tion dealing with specific phases of winter construction under local conditions.

This list would seem to run the gamut of factors essential to successful construction at any time of year, but particularly so during the cold weather portion. Perhaps the architectural profession might amplify it to a set of rules for embodiment in all specifications for construction that must go on through the winter.

Specification Clauses for Winter Work

Regarding actual specification clauses covering methods to be employed on winter work, most architects feel that there should be avoidance of the "ultra-specific." They reason, and quite justly, that these as well as other phases of construction should be capably cared for by any reliable contractor.

A "blanket clause" suggested by Lawrence Vischer Boyd, who has designed for suburban developments in the East many homes that have gone forward to completion during trying winter periods, has worked out satisfactorily. This clause, under the heading, "Winter Work," reads in part: "The contractor shall include in his estimate all facilities, such as appliances, known standard waterproofing, anti-freezing compounds and similar materials, as well as the employment of the latest and most approved methods and

means for combating the effects of cold and other winter conditions, which if not provided nor utilized, would impede the progress of craftsmanship essential to the results stipulated by the provisions of these specifications in whole or in part."

Winter conditions are covered in much the same manner by the Ballinger Company, architects and engineers, of Philadelphia. Under the heading, "Freezing Weather," the specifications read: "Materials used in concrete, brick or stone masonry, plastering or other work subject to freezing, shall be properly heated by approved methods when the temperature is below 33° Fahr. Any work damaged by freezing shall be torn out and replaced at the contractor's expense, and new work shall not be placed in contact with such damaged portions. The proper precautions shall be taken, however, to enable the work to proceed without interruption, if possible." Further, under the heading, "Temporary Heat," the specifications read: "The building contractor shall provide all temporary heat and make all other provision, such as temporary covering for door, window and other openings, which may be required for the performance, completion and protection of his work against cold until the building is completed, all subject to the approval of the architects."

Stating more definitely the precautions which must be observed in the handling of materials



Laborers "Mopping Up" an Overnight Snow Before the Day's Work Starts. Lines of Steam and Shovel and Broom Soon Clear Away an Otherwise Unworkable Area

most likely to be affected by winter temperatures, the body of the same specifications contains a clause headed "Cold Weather," which thus refers to concrete: "Reinforced concrete shall not be laid when the temperature is below 33° Fahr., unless special permission is obtained from the architects. In such cases the concrete ingredients shall be properly heated by suitable means immediately before being mixed. Should the temperature drop below freezing or when the U. S. Weather Bureau predicts such weather, fresh concrete shall be protected above and salamanders or other heat provided below. Canvas shall be placed some distance above the slabs and temporary openings be provided through slabs to allow the heat to circulate. Canvas curtains shall also be hung around the outside of the story concreted to retain the heat, and the temperature of the concrete must be kept above 40° for five days after concreting. Concrete that becomes frozen while fresh, and found to be injured, if it cannot be reclaimed by additional water or otherwise, shall be removed at the contractor's expense. Forms shall be left in place during cold weather until the concrete has obtained a hard, natural set."

So far as the specifications go, the matter of winter protection appears to be adequately settled by clauses such as those just quoted. They definitely require ample protection, and while concen-

trating responsibility where it properly belongs, they leave the contractor free to exercise his judgment, skill and ingenuity. It would be neither fair nor wise for the architect to establish inflexible rules and methods whereby the materials must be kept at correct working temperature or temperature maintained for all kinds of interior work. The contractor of standing is quite alive to the necessity of progressing with speed and efficiency, and is usually fully informed as to the best methods to fall back upon in any cold weather emergency. He does appreciate, however, the coöperation of the architect on these matters when it is given from a thoroughly practical and structural point of view.

Costs of Winter Construction

Provisions for extra winter costs and their distribution should be discussed frankly and completely, and be settled to the satisfaction of all concerned by agreement, before the need for expenditure arises. Architects whose practice is carried on in cold-weather latitudes know how great are the variables in additions and offsets of this character. It would require supernatural skill to incorporate them in an estimate on the basis of accurate forecasts, but an average can be struck that permits a safe approximate to be figured for contingencies.

It would seem best that this should be cared for by separate contractual instruments or clauses of the contract, so worded that the contractor may feel free to exercise his discretion in the utilization of ways and means required by unforeseen conditions. No matter how great may be his reliance on a contractor, the present-day architect is coming more and more to realize the importance of thorough familiarity upon his part with those details of construction that are most affected by winter influence. While not attempting to enter too far within the sphere of purely structural activities, he has found it well to be more than passingly conversant with the solution of numerous winter problems. Increasing understanding of these things is contributing the coöperation and coördination which few contractors and their crafts fail to appreciate.

Supervision of Winter Construction

Architectural field activities in the year-round building of today call for more than checking the details of design or superintendence that merely sees that the specifications are adhered to. Whether the plans require only occasional visits to the scene of operations, or are those for which the construction superintendent's office also becomes an architectural field headquarters with a clerk-of-the-works or architectural supervisor following

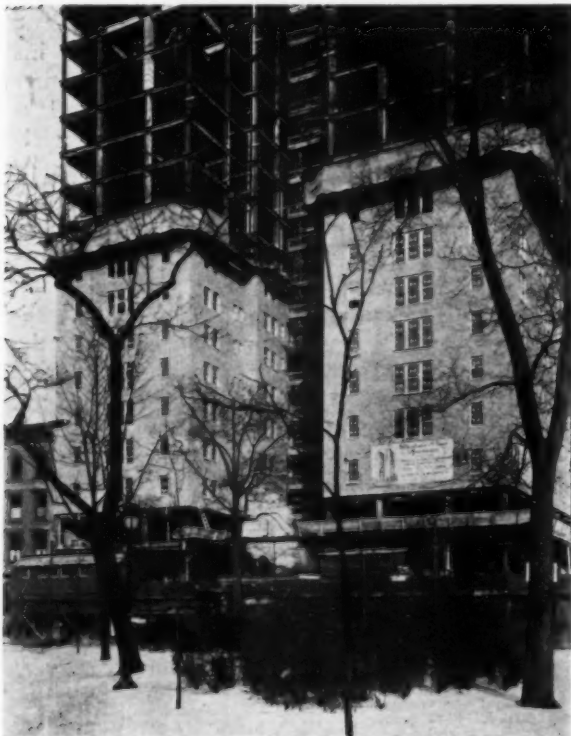
the progress of workers in a score of complicated crafts, the viewpoint of the architect should be closely akin to that of the men who produce the finished structure.

But a few days before this article was written, I visited an enormous piece of winter erection which by this May will probably be housing the equipment and personnel of a nationally known concern whose factory capacity and area must keep pace with tremendously increasing production. Stretching away on all sides, over acres and acres which a couple of months before were without a trace of building, and already at second-floor level, was developing one of the great architectural-structural creations of the present century. I was taken on a tour of inspection by the supervisor detailed to the work and the superintendent of the firm of contractors constructing this enduring expression of masterful design. Behind them I went into every part of that unbelievably complex thing of rivet-spating steel and snarling concrete mixers sending slushing cargoes to millions of feet of wall and floor and column forms. I watched hundreds of men, division upon division of craftsmen and laborers, working in perfect coördination and control,—carpenters, bricklayers, masons, equipment men, drivers of an unending stream of motor trucks delivering the tonnage upon which this giant fed and was growing so swiftly to maturity.

Progress,—unbroken, hitch-free, smoothly flowing construction everywhere! Above us, to the right, the left, and below, great tarpaulins flapped and strained across openings and surfaces which could be affected by the biting winter wind. Strategically placed salamanders glowed from within. Clouds of steam plumed the boiler sheds from which there radiated a web of temporary lines carrying required temperature control. "Weather Bureau report just in," said the construction superintendent, shoving up the sheepskin collar of his coat, "says it'll be hitting the low spots for a record cold snap,—29 this noon."

Their aides came and went,—assistant division superintendents, field engineers, foremen,—checking in, reporting, taking fresh orders, each with a definite responsibility and part to play. It was inspiring and made me realize just how definitely architecture has got down to brass tacks in standing shoulder to shoulder with the constructors in eliminating winter delays.

By playing a more coöperative part in aiding year-round structural progress, the designer is getting just far enough away from the ordered atmosphere and environment of his drafting room and conference chamber. His is a closer-knit alliance with the active elements of modern building. And, as a result, there are passing the restraint and reserve that have marked the craftsman's attitude toward architectural relations.



Simple Forms of Temperature Control Suffice for Open Steel Work. Tarpaulins and Scaffold Salamanders Protect and Warm Exterior Bricklayers, but Inside there Must be Steam Lines and Portable Radiators for Plastering, Tile and Marble Setting, and Other Types of Interior Work

PAINT ON CONCRETE SURFACES

BY

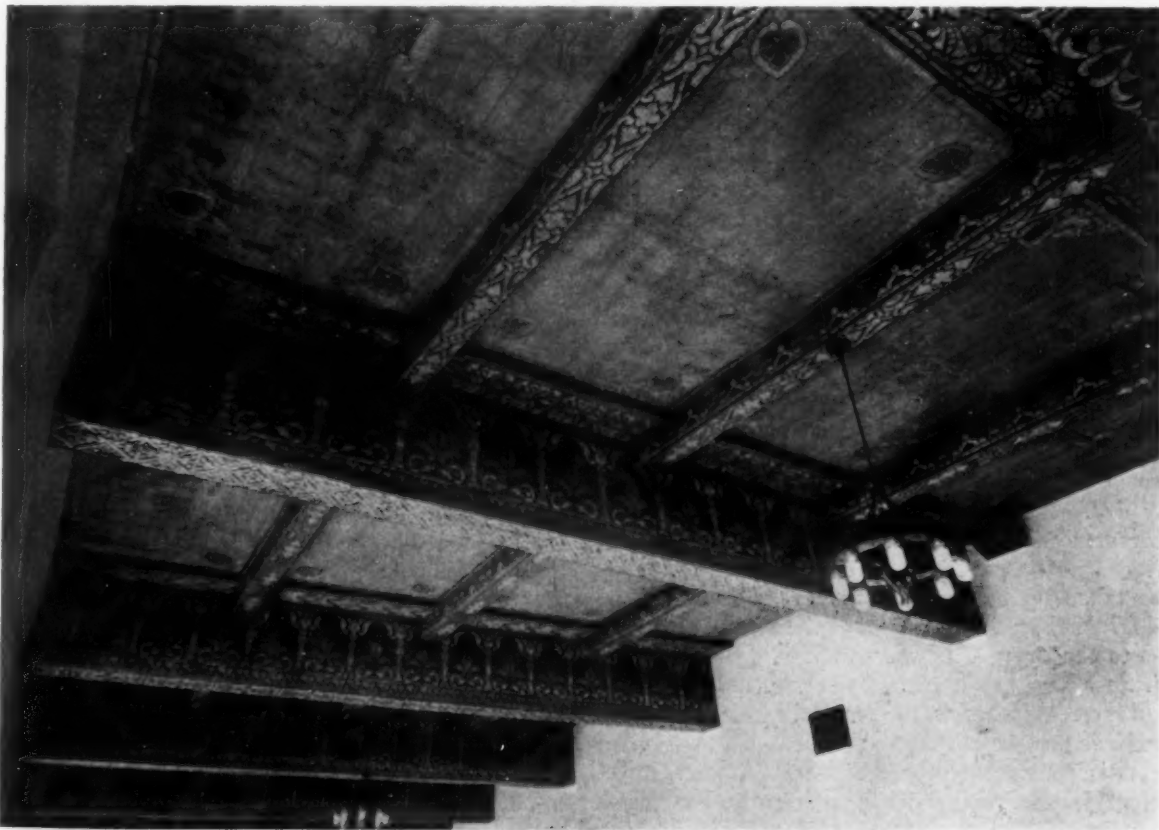
E. L. CALDWELL AND JAMES E. FOSTER

THE present-day tendency in architecture is toward making structure and decoration an organic whole. The modernists insist that there is a certain vigorous beauty in any design that is structurally sound. They point to the beauty of the Brooklyn Bridge, which is, from beginning to end, the work of engineers. While their more conservative colleagues will not follow this reasoning to its logical conclusion, they admit that structure and the decoration can be successfully fused without making a sacrifice of the traditional principles of good architecture. In architecture, at least, the modernist and the fundamentalist can meet on a common ground.

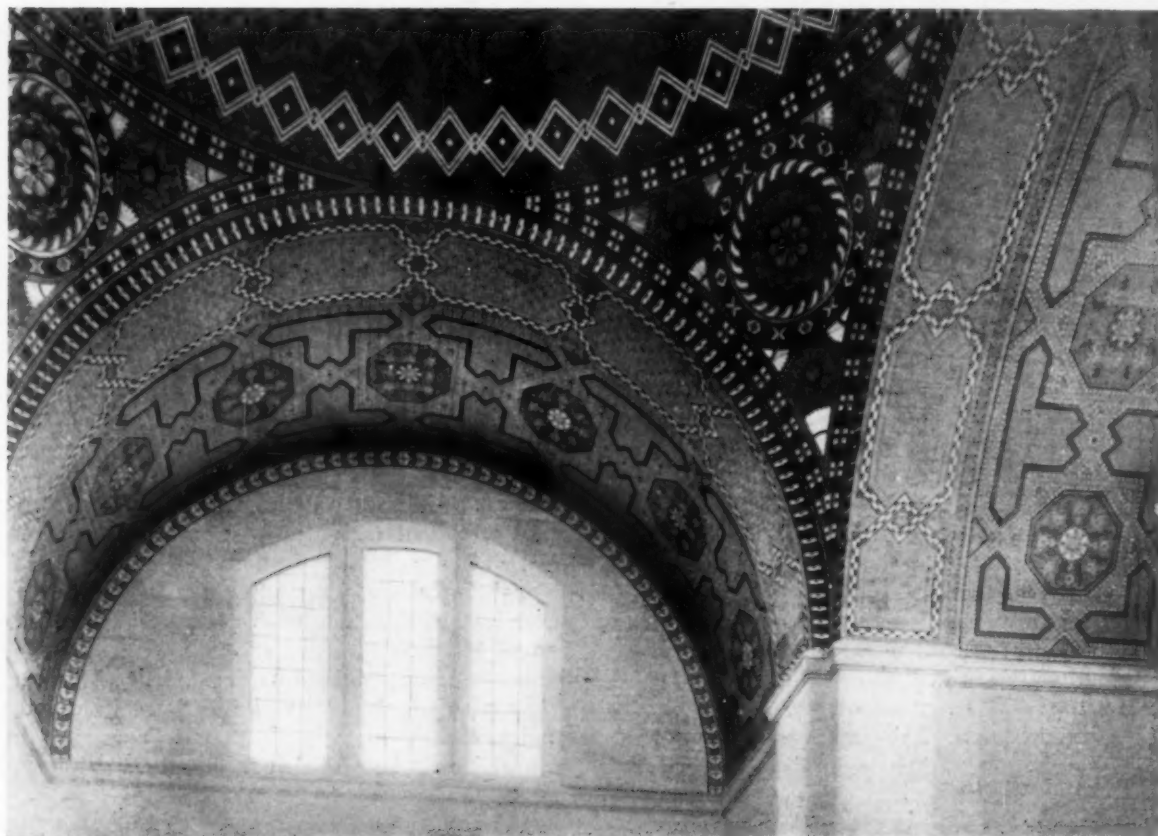
Reinforced concrete construction has adapted itself to this tendency. The reasons are obvious. The structural members require no treatment to make them firesafe. They are in themselves self-sufficient. Why, then, should interior members be covered? The texture of concrete has a distinct rugged beauty. Its somber gray, however, is not in harmony with the present demand for color,

—a demand that has extended to alarm clocks, to typewriters, to kitchen ranges, and even to refrigerators. The cry for color is being met by the application of paint and stains to concrete surfaces. This method of treatment has been used under many varying conditions and is definitely past the experimental era. A practical technique for applying paints to such surfaces has been in use for several years, and if it is followed by competent craftsmen, a pleasing and permanent effect will be produced.

Two major classes of paints are used on concrete,—oil and water paints. Oil paints may be further divided into lead and oil paints and cement and oil paints. A lead and oil paint is based upon the principle of grinding a pigment such as white lead in a vehicle such as linseed oil. These two materials,—white lead and linseed oil,—are the bases of most oil paints, irrespective of color. While pigments besides white lead are frequently employed, this material is usually present. In general it may be said that lead and oil paints in-



Detail of Monolithic Concrete Ceiling and Panels Decorated with Paint. The Form Marks Are Distinctly Visible and Form a Part of the Design



Intricate Stenciling has been Used Effectively on the Monolithic Concrete in the Los Angeles Public Library
Bertram Grosvenor Goodhue and Carleton Monroe Winslow, Associated, Architects

clude flat finish paints for interior decoration, mill whites, floor paints, and general purpose paints. Cement and oil paints are made by grinding Portland cement and other pigments in an oil vehicle. The vehicle is usually linseed oil or a mixture of linseed oil with Chinawood oils. White Portland cement is generally used for whites and light shades, and gray Portland cement is employed when the darker shades are produced. These paints dry to a hard, flat finish that may be rough to the touch.

The application of oil paints on concrete should not be started until the entire surface is thoroughly dry. From eight to ten weeks should elapse between the completion of the moist curing period and the painting. This time will ordinarily be taken up by the common cycles of construction. If there is any doubt at the end of this time as to the dryness of the concrete, sprinkle water from a wet brush over different sections of the surface. If this water is readily absorbed, the surface may be considered dry enough to serve as a satisfactory base for the paint. After new cement surfaces have dried sufficiently, a solution consisting of two or three pounds of zinc sulphate crystals mixed in a gallon of water is applied to the entire area. This treatment is used

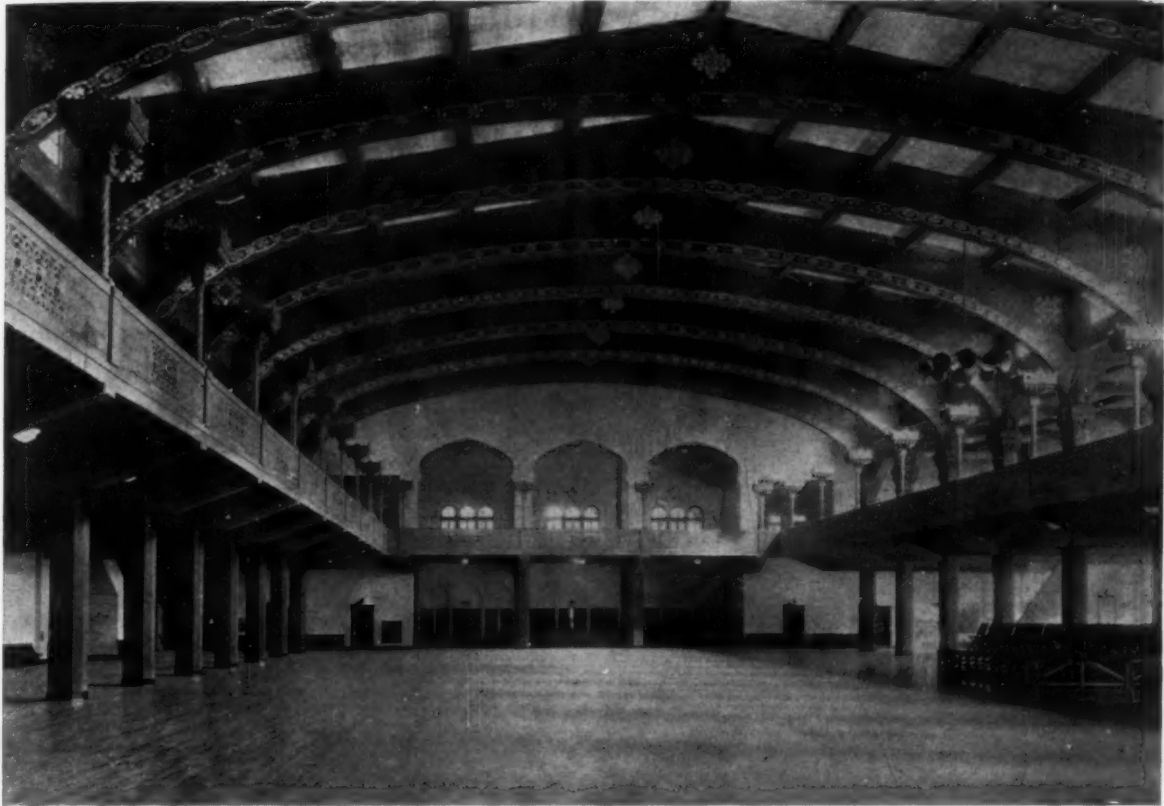
as a precaution against saponification of oil paints on fresh cement surfaces, which injures them.

The zinc sulphate solution is allowed to dry for at least 48 hours. At the end of this period all protruding crystals are brushed off, and the surface is ready for priming. When lead and oil paints are used, the surface is given a binding and suction-killing treatment. This consists of one or more coats of oil or varnish carrying some pigment. This binder can be made to the formula:

Oil paint	4 parts
Chinawood oil spar varnish	2 parts
Oil, turpentine, or some similar thinner	1 part

Chinawood oil is specified because it is more resistant to alkali than is linseed oil. Several manufacturers market special Chinawood oil priming paints for use on concrete.

This treatment is to kill the suction and is applied to both old and new concrete surfaces, and follows use of the zinc sulphate wash which is used on new concrete. When the binding and suction coats have become dry, the finish coat is applied to the surface. This is usually a stain made of boiled linseed and Chinawood oils, thinned with turpentine or naphtha, and colored with mineral pigments. Exterior lead and oil



The Concrete Ribbed Ceiling in Al Malaikah Temple, Los Angeles, is Effectively Painted
John C. Austin, Architect

paints may, however, be used, since they dry to elastic, water-resisting films, which fill up the pores of the surface. Flat, egg shell, and gloss interior oil paints, as well as finishing lacquer may also be applied, choice depending on circumstances.

From the standpoint of beauty, probably the best work has been done by staining the entire surface and then applying brilliantly colored paints to small areas by means of stencils. When this treatment is employed, the texture of the concrete in the stained area becomes an integral part of the decoration. When this technique is employed, the stenciled decorations are applied after the paints have dried. Various combinations of white lead, lithopone, zinc oxide, titanium oxide and inert pigments mixed with either linseed oil or heavy bodied enamel liquids have been used successfully for this work.

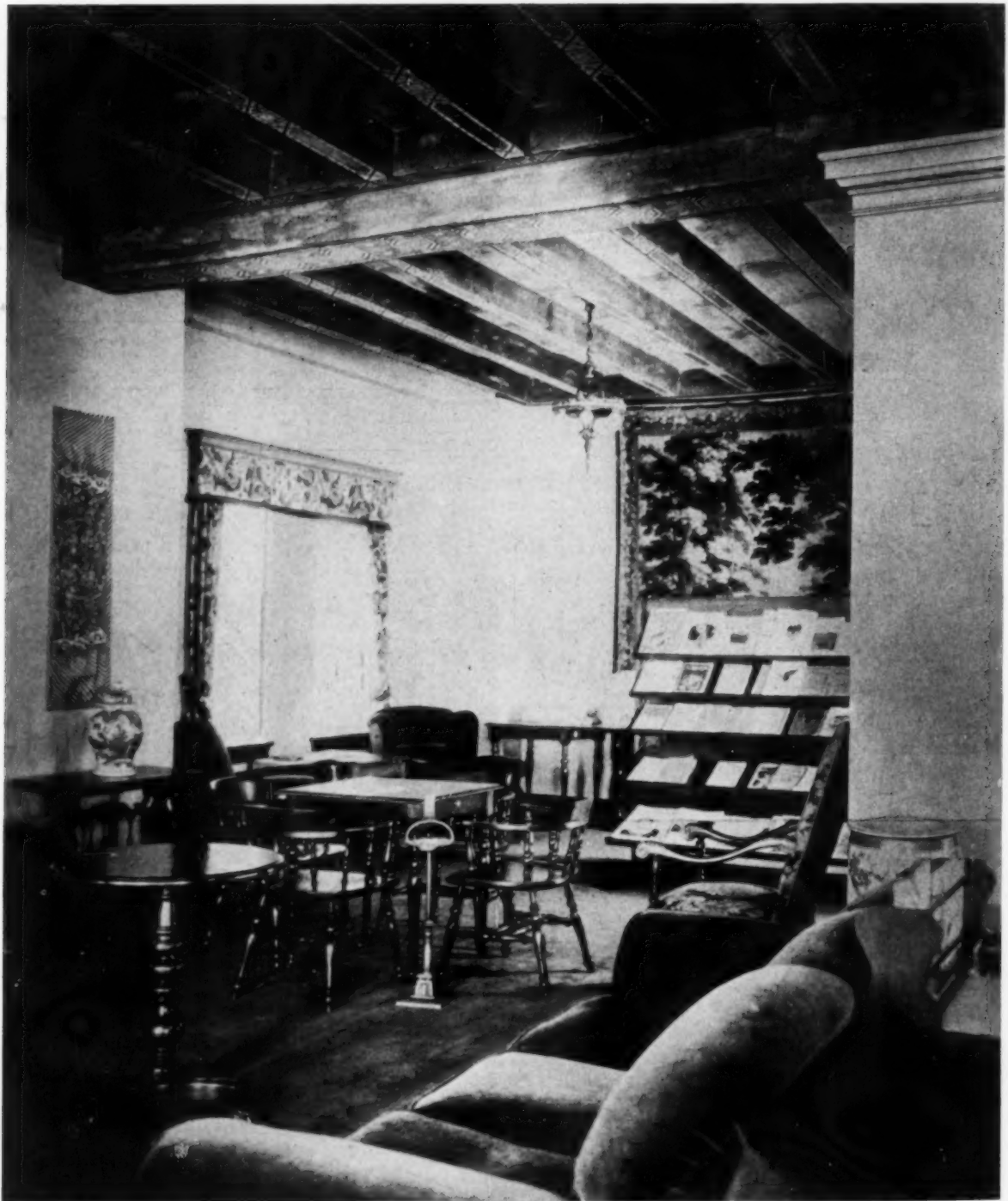
When stains are being applied, an elastic technique can be developed by using thin stains of low color value. Light areas can be built up to dark by the application of several coats. Ragging, smearing, and other reliefs from a solid surface can be secured. For any given color the number of coats will control the density. The final coat may be clear varnish, shellac, or lacquer, provided that it is applied after the underlying films have thoroughly dried. This is of course quite necessary.

Concrete floors can be finished with lead and oil paints containing abrasion-resisting pigments. Most manufacturers produce paints for this type of work. Their successful use depends upon application to a dry floor slab. The films they produce will give good service if the traffic is moderate and evenly distributed. Trucking, the dragging of heavy boxes, and the shuffling of feet are destructive of floor paints. If a floor will be subjected to such abrasive action, color should be provided by using mineral coloring pigments in the floor topping. General rules cannot be given for the application of cement and oil paints, since each manufacturer prepares directions applicable to his own product. As these directions vary somewhat, the technique of application is not uniform. The surface should, however, be prepared in the manner described for oil paints. Cement and water paints are made by mixing a dry powder, consisting of Portland cement and other pigments, with water. This mixing is done on the site. These paints usually dry to a flat finish. The concrete surface is wet down with water before the paint is applied. As the cement in these paints ought to be hydrated, they should be allowed to dry slowly.

The method of application is dependent upon the brand being used. For this reason, the manufacturer's directions should be closely followed.

As there are several techniques whereby paint can be applied to concrete surfaces, the architect of today can produce distinct effects by decorating exposed structural members. The architect who regards modern design as a significant matter and the architect who is wedded to traditional forms can make the exposed members of their structures form inherent parts of their decorative

schemes without compromising their professional principles. The elasticity with which paint may be applied to concrete offers new opportunities for artistic treatment. The fact that the various techniques are in accord with sound construction principles assures the architect that he can specify this method of treatment with certainty that the resulting finishes will be permanent in character.



Painted Concrete Ceiling Beams Give This Reading Room Its Distinctive Character

SCHOOL CONSTRUCTION AND MODERN EDUCATION

BY

J. CAYCE MORRISON

ASSISTANT COMMISSIONER FOR ELEMENTARY EDUCATION, STATE OF NEW YORK

BEFORE me is the west wing of a beautiful building devoted to the preparation of teachers for the public schools. It stands four stories, on broad grounds, overlooking a magnificent cluster of forest trees, facing the setting sun. As one looks toward it from the distance, one takes in simple vertical lines—an effect secured in large measure by windows, arranged in rows, alternating groups and single windows—from basement to roof. Outwardly, the effect is all the most critical artist could ask. Entering, one walks down the corridor past the open doors of six executive offices. These offices measured in floor area are approximately the same size; each is to accommodate three professors. Alternately, they have one single window, then a bank of three windows, a single window, again three, and so on. Half these office rooms are flooded with light, cheery even on relatively dark days; half are dark and dreary. The man who draws the strategic position next to the window fares reasonably well; the other two are doomed to strain their eyes in comparative twilight on bright days and to resort to electric light the remaining time. For what purpose, windows? To serve as exterior ornamentation or to supply light to those who work inside? This one incident, typically legion, illustrates the great conflict going on between the older school of architecture, which looked only to outward design, and the new which dictates that all architectural detail shall be subordinate to purposes the building serves.

Not so many years ago, a school building was an aggregate of classrooms, a collection under one roof of a number of one-teacher schools. A world war drove home to the public consciousness the value of physical training as a means of education. Physical education requires a gymnasium. Boys and girls need different exercises. Therefore, two gymnasiums in large schools, and one in every school. Gradually, there evolves a philosophy of education, which formulates the doctrine that to properly prepare children for citizenship they should have 12 years' practice in the exercising of citizenship. But practice in citizenship requires a public forum—therefore, the auditorium. The "little theater" idea grows. "The play's the thing." Why not teach the drama through developing the dramatic instincts inherent in children? The auditorium becomes a little theater, and lends itself as readily as would the Metropolitan to the budding musicians and artists of the school population,—to genius developing.

Here and there, ever more frequently, from the voice of the people comes the thought that music and painting—the fine arts—constitute a part of the fundamental need in the training of children, quite as much as do the three R's of the olden times. And so the architect must find a way to include a studio that will inspire children to strive for the artistic; and a music room that will have its orchestra pit, its stage, its separate exit, its comfortable provisions for a small audience—yet be soundproofed from the remainder of a building. A generous community authorizes its authorities to add swimming to the school curriculum. Where shall the architect place the pool—in the basement as a companion piece to coal bins and ash scuttles, or in a wing under a skylight, with borders of ferns and palms, with theater chairs for the spectators, where an hour in the pool becomes a joy and delight, where swimming adds to grace and muscle and becomes an exhilarating experience in a dignified setting? The teachers of household arts demonstrate the necessity for a laboratory. Their laboratory is a home—at least an apartment. Can the architect build an apartment that would kindle the eyes of a bride yet build it in a public school building? Many architects have tried; few have succeeded.

The public school must serve those who will labor with their hands as well as those who will work with their brains. Carpentry, plumbing, electric wiring, blacksmithing, automobile repairing, and a score of other trades must be provided for in the instructional program of the school. It is a long cry from the aggregate of classrooms constituting the old school to the new building that includes shops for these various trades. What kind of an arrangement of space and light will best serve the interests of the commercial department? Is there to be a history room? A geography room? A mathematics room? An English room? A Latin room, and so on? Each has its own special needs, requiring a special adaptation of all the elements out of which architects weave their magical effects.

Without carrying this analysis further, it is evident that the men and women who are using public school buildings have found an articulate voice, and that architects must plan their work primarily in terms of the services the several parts of the building are to render, and that only after this end is attained may they consider the outward architectural effect. Nor is the matter as easy as even the foregoing would imply. Our



There is Educational Value in Good Design and Construction of Schools
Main Building and Auditorium Wing, Public School, Lake George, N. Y.
Edward S. Hewitt, Architect

conceptions of the services the school should render have undergone tremendous changes during the past 25 years. Schools erected near the close of the last century are now hopelessly out of date. Our new buildings of fireproof construction should be good for a half-century, at least. But who is wise enough to foresee all the uses that any community may want to make of its buildings 50 years or even 25 years hence? The room planned for biology now may be needed a year later for a school clinic, and the household arts laboratory apartment may take to itself the more prosaic function of recitation rooms. Even the

wings devoted to the ordinary classroom service of our elementary schools at the present time may a decade later be transformed into the special laboratory rooms of a new type of elementary school organization that throws into the discard our varied compartment type courses of study. We want our architects to give us flexibility. Partitions will come out, new partitions will go in, yet ventilation, light, exits and a dozen other details must fit the new arrangement.

A word further concerning the adaptation of school buildings to the hygienic, sanitary welfare of those who work in them. I accept a position in a great educational organization. I am assigned to a small office with a double window at one end, overshadowed by a monstrous building designed for religious worship. Three assistants share this office with me. Except on rare summer days the light from the window is insufficient. An electric light from overhead makes possible the accurate statistical work we are to do, cross lights on the paper, the glare of an electric light from improper fixtures. More trade for the oculist. As good a pair of eyes as man was ever given crippled for life. In thousands of American private and public school classrooms the same sin is being committed against little children who have not the right nor the understanding to protest, and this goes on continually.



Gymnasium Wing of the Public School,
Lake George, N. Y.



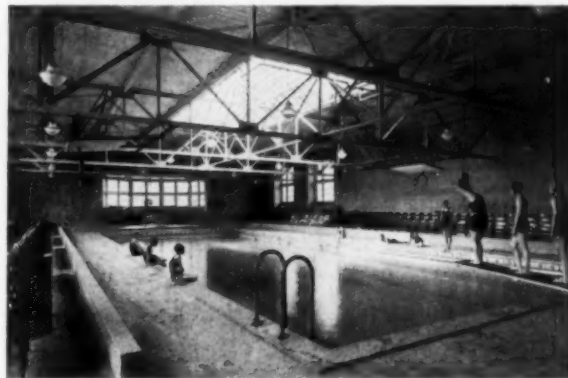
✓ Rooms such as this Library and Study Hall exert an Influence of Themselves
Edward Lee McClain High School, Greenfield, O.
William B. Ittner, Architect

We have not yet solved all the questions of ventilation. Shall warm air enter on the level of or above children's heads, which should be relatively cool, or at their feet which should be relatively warm? Shall toilets be placed in comparatively dark, inaccessible corners of the basement, or shall they be so located as to derive all the natural sanitary benefits obtainable from the sun's rays? To be sure most of these questions of adaptation to hygienic and sanitary needs are answered in the Strayer-Engelhardt Score Cards for Elementary and High School Buildings—detailed specifications, built up over a period of years with the assistance of the best minds in the engineering and architectural professions. The tragedy is that throughout this country school buildings are being erected under the supervision of architects who make no effort to know or understand these issues and the remedies that are available.

But to plan a building that meets the best known tests as to hygiene and sanitation, that serves adequately all the educational functions to be carried on within its walls, and that is flexible enough for adjustment to all reasonable variations in school procedure—even the attainment of these ideals is not enough. The demand for standard classrooms, for adequate lighting, for economy of construction has brought about a

type of school architecture that readily lends itself to the criticism that it is factory-like, that it is a living expression of the spirit of people who think only in terms of unit production, and have no higher thought than the black smoke which is being poured from a factory furnace.

We have gone a long way toward attaining efficiency in plan, economy in construction. Can we attain beauty without extravagance? I have in mind two school buildings, designed to accommodate approximately the same number of pupils, opened for use during the past year, both dedicated within the present month. One is plain,



Swimming Pool of the McClain High School,
Greenfield, O.

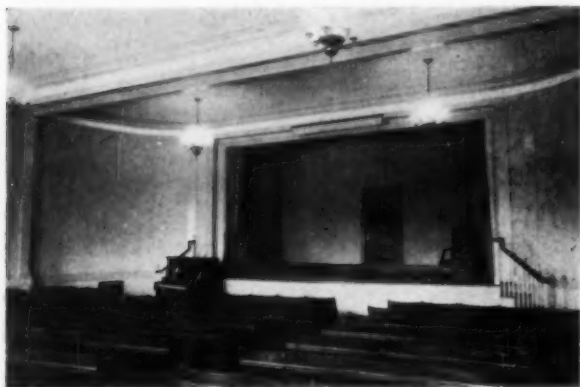


Public School Building at Beaver Falls, N. Y.

Franklin P. Hammond, Architect

stern, forbidding, lacking in every quality which appeals to the eye appreciative of the beautiful in architecture. The other is simple in design, soft, mellow, with a touch of the Colonial, pleasing to the eye, inviting to the wayfarer who would seek a quiet place for repose. The first cost more than \$200,000, the latter less than \$100,000. Why the difference? I think the chief element in the difference was the architect. Another question! Which will prove the best educative influence in the lives of the generation of children that will pass through its portals?

I sat late one afternoon in the library room,—



Assembly Room of the Public School at Beaver Falls, N. Y.

the most beautiful schoolroom I have ever seen,—with the principal and superintendent of the Edward Lee McClain High School, Greenfield, O. At one end was a beautiful mural depicting the harvest season of America, at the other was an equally attractive mural of the immigrant coming to America. Here and there were paintings and statuary. The tables were of oak in simple design. The chairs were Windsors. I noted the ferns with long hanging fronds against the paneled walls, and windows that furnished ample light yet melted into the general effect. The principal was saying, "We have been in this building eleven years, and last month we erased the first pencil mark. A new boy who had just come to us wrote his initials on an inkwell. He had been here only a week and had not yet caught the spirit of this school." And the superintendent added, "We are proud of that record," and, a little later: "We know here that this type of school building and furnishings has an educative influence on the minds of children."

I go before one school assembly. Dust-covered physical apparatus is in evidence. The odors of a poorly ventilated gymnasium are obvious. The walls are spotted from the prints of the basket ball and are lined with pencil marks. What impressions will these children take home? I go to another assembly. The walls are tinted a light

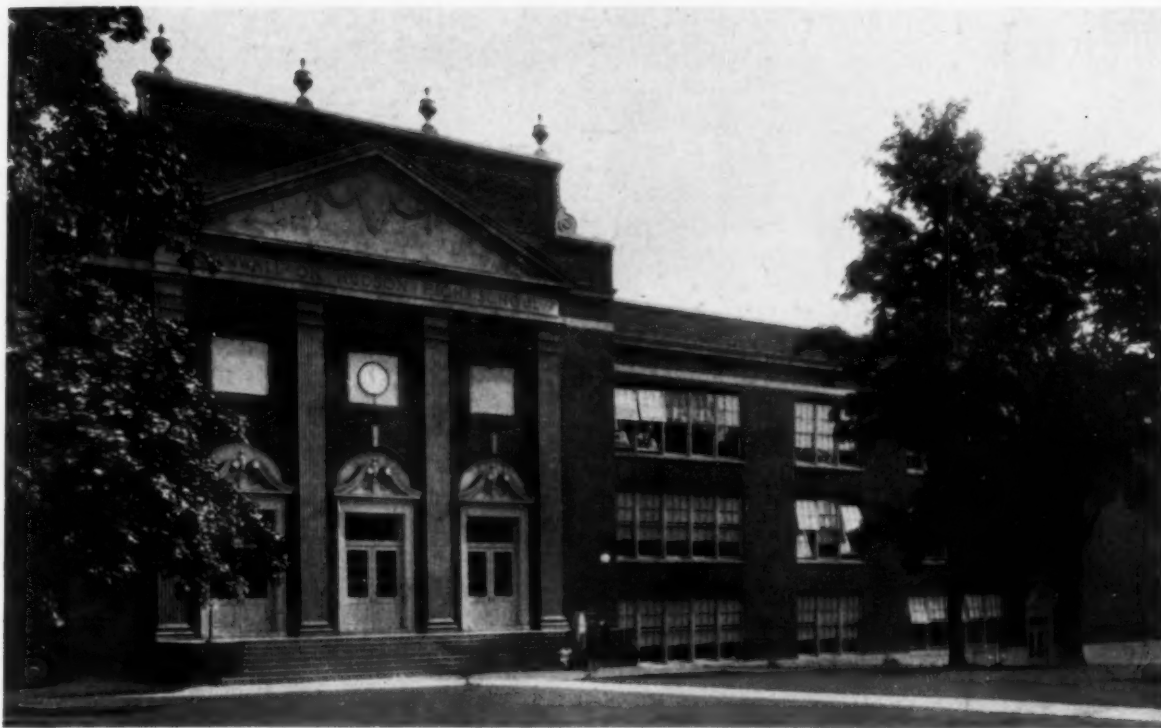


Photo. Richard Southall Grant

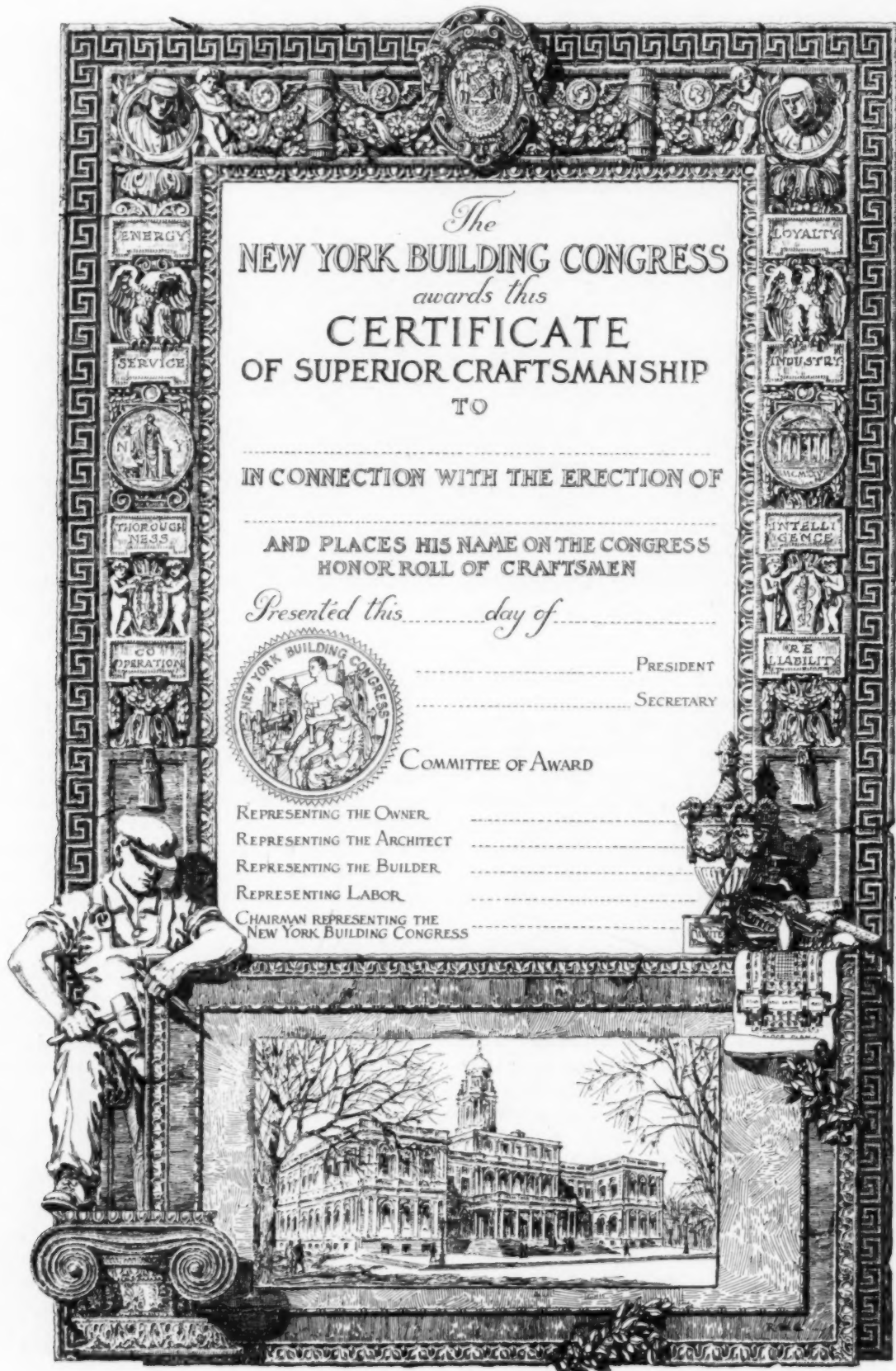
High School Building at Cornwall-on-Hudson, N. Y.

Tooker & Marsh, Architects

blue. The beams and columns are delicately lined. The chandeliers would grace the home of wealth and culture; they are simple in design and soft in effect. The curtains on the windows and on the stage blend into the harmony of the room. Back of me the paneling at the rear of the stage lends its grace of line. What will the children who sit here day after day unconsciously absorb into their impressionable natures to become an indelible part of themselves and all they meet? "If you get simple beauty and naught else, you get about the best thing God invents." Will not the children who spend five to eight hours daily, 200 days a year, for 12 years in a school building that expresses simplicity, harmony, beauty in its every detail come to feel in their inner consciousness a delight in beauty, a love for it, a feeling of need for it? And, conversely, will they not come to feel a certain repugnance for crudity, come almost to the point where they will be hurt by the clash of colors, the loss of symmetry, the ill proportioned? Will not the children who spend 12 years in a beautiful building consciously or unconsciously carry the effect of their sojourn into their own homes? And may we not, in a later generation, have a recrudescence of the beautiful in our homes and home furnishing that is now so sadly lacking in a great part of America's home building? The attainment of beauty demands more than wealth.

It is a reflection of an inner spirit, and it can find expression in the humblest dwelling as well as in the greatest mansion. Every touch of the architect's pencil, every line of his specifications mean beauty or the lack of it, not only in his building, but more so in the hearts of the children who use it and of the teachers who instruct.

But the public schools serve more than children. They may shape the feeling if not the thinking of the grown ups who enter occasionally but pass them daily. In the little village at the lower end of New York's most beautiful lake stands a new public school building. The main center building with a wing at either end—one for auditorium, the other for gymnasium—is beside the main highway. It stands on high ground, surrounded by a new growth of native forest, facing across the lake to the mountains beyond. In every detail there lives again the best Colonial of the Georgian period. It embodies the spirit of the forefathers, a fit expression of the Colonial period through which the village gained its first fame, a beauty spot in an attractive modern village, and a fit companion piece to the famous lake. It is a challenge to the passerby to stop and question why his community cannot build likewise. A view of Lake George's beautiful new school raises the hope that in time our public school buildings may come to express the true spirit of the communities in which they stand.



RECOGNITION OF CRAFTSMANSHIP

HOW IT IS PUT INTO EFFECT

BY

WM. O. LUDLOW

AN article in THE ARCHITECTURAL FORUM for January quoted some statements of representatives of many of the elements of the building industry,—owners, architects, contractors, and labor,—telling of the interesting results that have been accomplished in New York by the awarding of certificates and gold buttons to the most proficient mechanics on large buildings recently erected.

The remarkable popularity of this "Recognition of Good Craftsmanship" seems to be further indicated by the recent organization of committees to conduct this work in a number of large cities of the country. These committees have been formed generally by the chapters of the American Institute of Architects. In many more places other chapters have such a program under consideration, and it even seems quite possible that the Royal Institute of British Architects will set up in Great Britain work of similar character. The reasons for this popularity are not far to seek, but it may be well to review them.

First, and most important in my estimation, is the fact that there is an underlying consciousness in every man that there is really something more of interest in his life than merely getting the "almighty dollar." I know this is not always recognized, even by the man himself, but a careful examination of the real motives that actuate most of us discloses the fact that such sentiments as loyalty, good will and friendship are really the moving factors in what we do. Now this approval of the recognition of merit is primarily brought about by a sense of fair play, friendly feeling and an appreciation of the value of good work. Lincoln once said he tried to base every decision of his life on "what is right," and when he had accomplished that, he had invariably made the right decision. The recognition of a man's worth and the worth of fine accomplishment is inherently "what is right."

There are, of course, other elements which enter into the cause of the popularity of this movement. Nearly everybody wants good work, and this is surely an incentive to giving good work. Everybody in the building trades desires work done with the least possible friction and with the best possible understanding among those who produce the work. Recognition of Craftsmanship helps to this end by providing for the workmen an incentive beyond merely the pay envelope. Another reason for the popularity of the Recognition of Craftsmanship is rather more sordid,

but a reason yet to be recognized. It is the feeling of the owner that he not only gets a better building, but that he gets considerable advertising out of the fact that his building is constructed by men who are publicly recognized for superior workmanship.

Of course, the architect is glad to have his building recognized in this way, and perhaps too, if we may dare say it, he is glad of a certain amount of acclaim which will come to him as the architect of the building. But further than that he is the one, more than any other, who is interested and insistent on the good quality of the workmanship that goes into his building. Then, too, the contractor of the better class likes this method of recognition of good work, very much for the same reasons as have been accredited to the owner and architect, but he is particularly anxious that it shall be known that he is a builder of well built and notable structures.

As to the men themselves, little need be said as to why they appreciate this recognition. One simply has to imagine oneself in the place of one of these men to know how he is likely to feel when, in the presence of his fellow workmen, he is called to the platform to receive from the hands of the representative of an impartial body a handsomely framed certificate and gold button and told that he has "made good."

Further, it is not hard to understand why this work has appealed to such a number of chapters of the American Institute of Architects. First of all, the better class of architects, as a rule, are men who appreciate the higher motives of life, as well as a better quality of workmanship. Then, some of these chapters have felt that this kind of activity, with its attendant publicity, gives them a standing in the eyes of their community as a group of men interested not only in their fees, but interested likewise in quality work and the welfare of the men who produce it. Many chapters perhaps also feel that they need an activity that will command the interest and enthusiasm of their members if they are to hold their organizations together. Perhaps also the rather remarkable spread of this work is further due to the comparative simplicity of setting up the necessary machinery either by a Building Congress, where such exists, or by a chapter of the American Institute of Architects.

The question is often asked, "How do you start such a program?" I venture these suggestions:

1. The whole plan should be placed before the

Congress or chapter in such a way that the members will not only see its advantages but shall really become enthused. A committee should then be appointed to take charge of the work, and I should like to make emphatic at this point that the success of the work will depend on whether or not the head of the committee has outstanding ability and a real enthusiasm for the cause.

2. The step that the committee should first take is to get the whole-hearted interest of some of the best builders in the city, and also to get the interest of labor, for unless these two elements are brought in "on the ground floor," the processes of "selling" are more difficult. There should be a real feeling of partnership among the architects, builders and labor to obtain whole-hearted coöperation. This partnership is necessary also to prevent the feeling on the part of the workmen that they are being patronized; labor will not be patronized. Moreover, the workmen are likely, at first, to be suspicious of some ulterior motive,—suspicious particularly of an attempt to "speed up." Enlisting labor leaders on the partnership basis dispels this.

3. Awards are of two general types. (a) On large buildings, to the best mechanic in each trade, with appropriate ceremonies of presentation held in the building while under construction,—one ceremony about the time of enclosure, with awards to the structural trades, and another shortly before completion with awards to the finishing trades. (b) Individual awards, the honor men being selected irrespective of the building where employed. The (b) method is most useful where few large buildings are erected.

4. In type (a) awards, nominations are requested from the architects and contractors in coöperation with the superintendents and foremen.

In type (b) awards it is advisable that nominations be received only on solicitation by the committee from trusted individuals.

5. The awards are made to encourage workmen to better effort and are not made to foremen or to those in executive or supervisory capacities.

6. Nominations are of value only as coming from nominators who have been thoroughly informed as to the real purpose of the awards. In selecting the candidates for awards, favoritism or any appearance of favoritism must be carefully avoided.

7. When a building has been selected for award a special "Committee of Award" should be appointed, this committee to consist of the owner, the architect, the builder, a representative of labor and a representative of the awarding organization.

8. The best means of selecting the men to be

honored is to explain the idea very fully to the superintendent and to the foremen on any particular building which is of such character as to merit the awards. The foremen should be instructed to select with great care one or two of the best men working in each of their particular trades. These names are then passed on to the superintendent for approval and then should go to the Committee of Award for final determination. It is highly advisable to have some outstanding labor man on the Committee of Award in order that the names may be vied by labor, and in order that nothing may be inadvertently done which would be unfortunate from the labor angle.

9. Ceremonies of award should be made as impressive and as important as possible. Awards are public; all workmen on the operation, their wives, their friends, and the general public are invited.

10. Photographs of presentation ceremonies, news items, and articles on the value of craftsmanship featured in the public press, and the widest publicity possible for the awards and their purposes are essential.

11. It is quite possible for the entire work to be conducted without any expense to the organization which sponsors it. In New York practically the entire cost is borne by the owners of the buildings. A charge of about \$10 to cover the cost of each certificate, gold button and clerical work is borne by the owner of the building. It has been found that there is no difficulty in persuading owners to do this, as a matter of \$100 or so is a comparatively small item on a building enterprise involving hundreds of thousands of dollars. Moreover, the owners readily recognize the considerable advertising advantage which they get from awards being made on their buildings, even though they may not have a broader vision of the splendid ideals upon which the movement is founded.

In New York we have found it surprisingly easy to enlist the sympathy and coöperation of owners, architects, builders and labor, for all of these elements, if not interested principally from an altruistic motive, see at least a personal advantage of great possibilities. Of course it is most desirable, however, to put the whole matter where it deserves to be placed,—on the high plane of great and splendid service not only to the building industry but to every individual concerned,—for the stirring of ambition to do nothing but a high grade of work ennoble a man's whole life, brings him a contentment that he has not known before, makes him a man of finer ideals, and in a word does something to create a better citizenship as well as a far worthier nation.

DETERMINING FUEL REQUIREMENTS BY THE DEGREE-DAY METHOD

BY

P. E. FANSLER

ASSOCIATE EDITOR, HEATING AND VENTILATING MAGAZINE

LATE one afternoon, bound to Washington on the "Congressional," I fell to speculating on the possibility of developing a plan whereby fuel requirements could be pre-determined for any building in any part of the country by an engineer or architect located in any other part of the country. It was a problem at once difficult and fascinating. In the old days of the heating industry, the contractor, making up an estimate of radiation requirements, would enter a room, give it what was in those days the equivalent of the "once over," jerk his thumb at the ceiling and say: "This room needs about 35 feet." Perhaps this procedure was responsible for the phrase "rule of thumb!" Usually his "guesstimate" was pretty close to the amount of radiation that would be determined through the use of modern rules and tables, but such procedure was entirely localized; had this contractor been asked to estimate for a building located where the weather conditions were materially different, he would have been completely at sea. The rising tide of scientific achievement has evolved tables and methods whereby the heating engineer in New York can determine radiation requirements for a building in Minneapolis, Chicago, St. Louis or Seattle with equal ease and accuracy.

This was the thought foremost in my mind. Would it not be possible to evolve a method of evaluating *heating loads* in different cities so that graphs or similar devices could furnish accurate data upon which fuel determination and comparison could be based? Engineers of the American Gas Association, some years earlier, had determined that a "daily mean temperature" of 65°, as defined and reported by the U. S. Weather Bureau, was the dividing line below which the

average home owner required artificial heat and above which it was not necessary. This was a purely empirical determination, made over an extended period of time and covering a sufficient number of cases to insure accuracy. Some bright mind then coined the term "degree-day" to represent the product of a "difference of one degree below this datum point" and a "24-hour period." In other words, with a "weather bureau temperature of 65°, a condition of equilibrium exists, and no artificial heat is required. It might be thought that this is too low a temperature, but it must be remembered that, where the "daily mean" is 65°, the temperature during daylight hours will be 70° or above. If, now, the daily mean temperature is 64°, it is apparent that the heating requirements for this 24 hours can be measured by $(65° - 64°) 1° \times 1 \text{ day}$, or 1 degree-day. Likewise, with a daily mean temperature of 60°, the heating load could be designated as 5 degree-days, and with a daily mean temperature of 37°, the quantity "28 degree-days" would be the measure. I have had quite an extensive correspondence trying to find out who first used the term "degree-day," seeking to place the credit where it is due, but without success. Certain it is that it was used as far back as six years, and perhaps farther. It is only for the last three years, however, that the value of this term has been appreciated, and it is largely through influence of the American Gas Association and *The Heating and Ventilating Magazine* that its use is spreading.

Having thus formulated a method for measuring and designating the heating load for any given day, based on the establishment of the point below which heat is required and of the factor representing the amount of heat demand, it is a

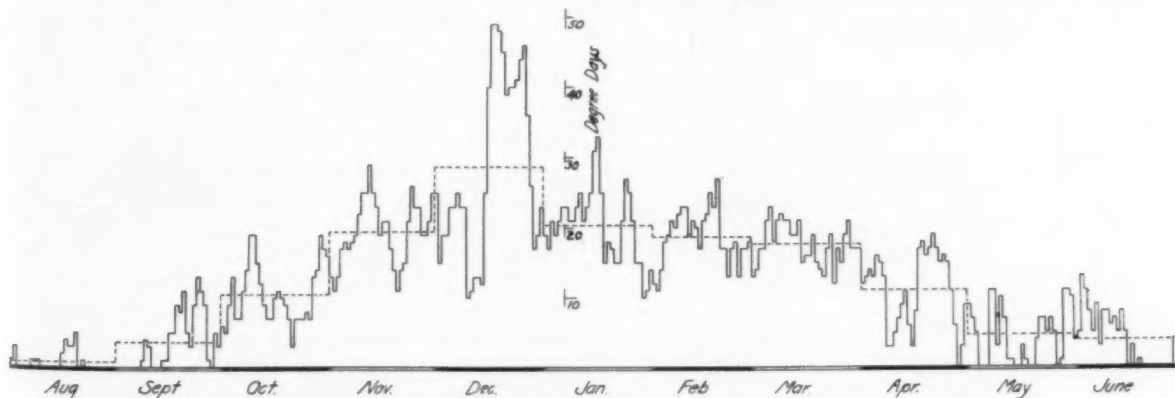


Fig. 1. How the Heating Load for Any Locality Can be Pictured in Degree-Days
Heating Requirements for Portland, Ore.

simple matter to find how much heat is required over a month or a heating season by adding together the heat demand for the several days involved. We then have an expression of the heating load for the month or the year. For the architect or engineer, trained to visualize from graphs and charts, it is a simple matter to plot the heating load for any given locality. For this purpose recourse is had to the records of the U. S. Weather Bureau, covering 50 years or more. To be of value, the heating load must be determined from average data, as a base; then supplementary computations can be made for current, or any other, requirements.

Heating loads in degree-days of four characteristic cities are shown here in Fig. 2. The contrast between the graph for Los Angeles and that for Minneapolis, and the similarity of the New York and Minneapolis profiles are evident. The Portland, Ore., graph shows a condition that is ideal for heating with gas. The maximum is only about half that for Minneapolis, yet the heating season lasts for ten months of the year.

The next procedure was to determine the heating loads for each month and to convert these into percentages of the annual load. This makes it possible to pre-determine the fuel consumption for any month in the heating season. Fig. 3 shows how these data can be plotted. This presentation has proved of no small value to the oil-burner salesman who makes a sale late in the

season. Soon after the completion of the first month of use, which might be December, the salesman has a telephone call or a letter from an irate customer. He is informed that he has grossly misrepresented the burner, and that, while it has operated in a satisfactory way, it has used an excessive amount of fuel. The customer, reading his tank gauge, has found that he has consumed nearly 500 gallons of oil. He figures that there are eight months in the heating season, and that therefore he will use 4,000 gallons for a complete season. The salesman had told him that he should use between 2,500 and 3,000. This looks as though he had been "stung." Then the salesman must take the time to call on the customer, show him the graph (for that particular city) and point out that in December a consumption of 20 per cent of the total for the season is correct. This would mean, for the whole season, 2,500 gallons. Such use of these graphs has been, and is, common. Another use is to show whether the heat demand for any given month is above or below the normal demand for that month. February, 1927, in New York, was an unusually warm month,—at least everyone commented on the weather from day to day. The graph, Fig. 7, presents the facts of the case. Only on six days of the month was the heat requirement up to normal. Fuel consumption during that month was far below normal.

Now we come back to the beginning of this story. I wanted to find some way of expanding the degree-day idea and to enlarge the scope of its usefulness. The idea was to compute degree-day heating loads for hundreds of towns where U. S. Weather Bureau Stations were maintained, and to mark down the degree-day figures on a large map of the United States. Then, by drawing flow lines through points where the heating loads were equal, I would have a chart possessing something of the nature of an iso-thermal chart, except that the "contour" lines should represent "heating load." Then any building located on any iso-degree-day line would require, for each square foot of radiation, the same amount of heat that would be required by any other building located anywhere on the same line. The idea was simple, but the computations arduous.

More than 12,000 computations were made and checked. Now, what does it mean, and of what practical use is it? A logical step toward making it practical was the production of three derived charts, an iso-coal consumption chart; an iso-oil consumption chart, and an iso-gas consumption chart. Each of these affords a direct method of finding how much of any specific fuel is required for a normal heating season to provide for 1 square foot of radiation, assuming always that the radiation has been properly placed and is ade-

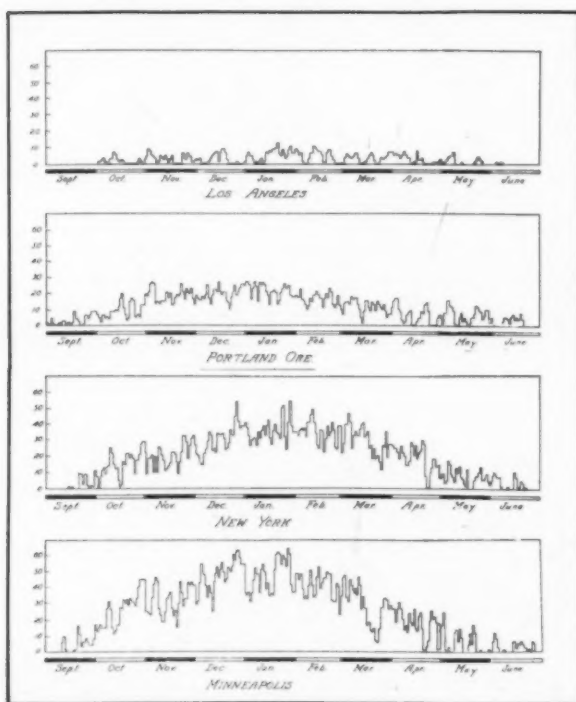


Fig. 2. Graphs of Heating Loads of Four Typical Cities. The Long But Not Intensive Heating Seasons in Los Angeles and Portland are Important Factors in the Widespread Use of Electricity for Heating in Those Cities

quate. If the radiation is excessive or insufficient, the results will vary in the same ratio.

The "degree-day" figures on the iso-degree-day chart have been replaced, on the iso-oil-consumption chart, by figures representing the gallons of oil necessary to provide heat for 1 square foot of

steam radiation under certain defined conditions, one of which is that the efficiency of the heating plant has been taken as of 100 per cent. This may seem illogical, but it is quite the opposite. It is easier to determine the consumption at 65 per cent efficiency where it is known at 100 per cent

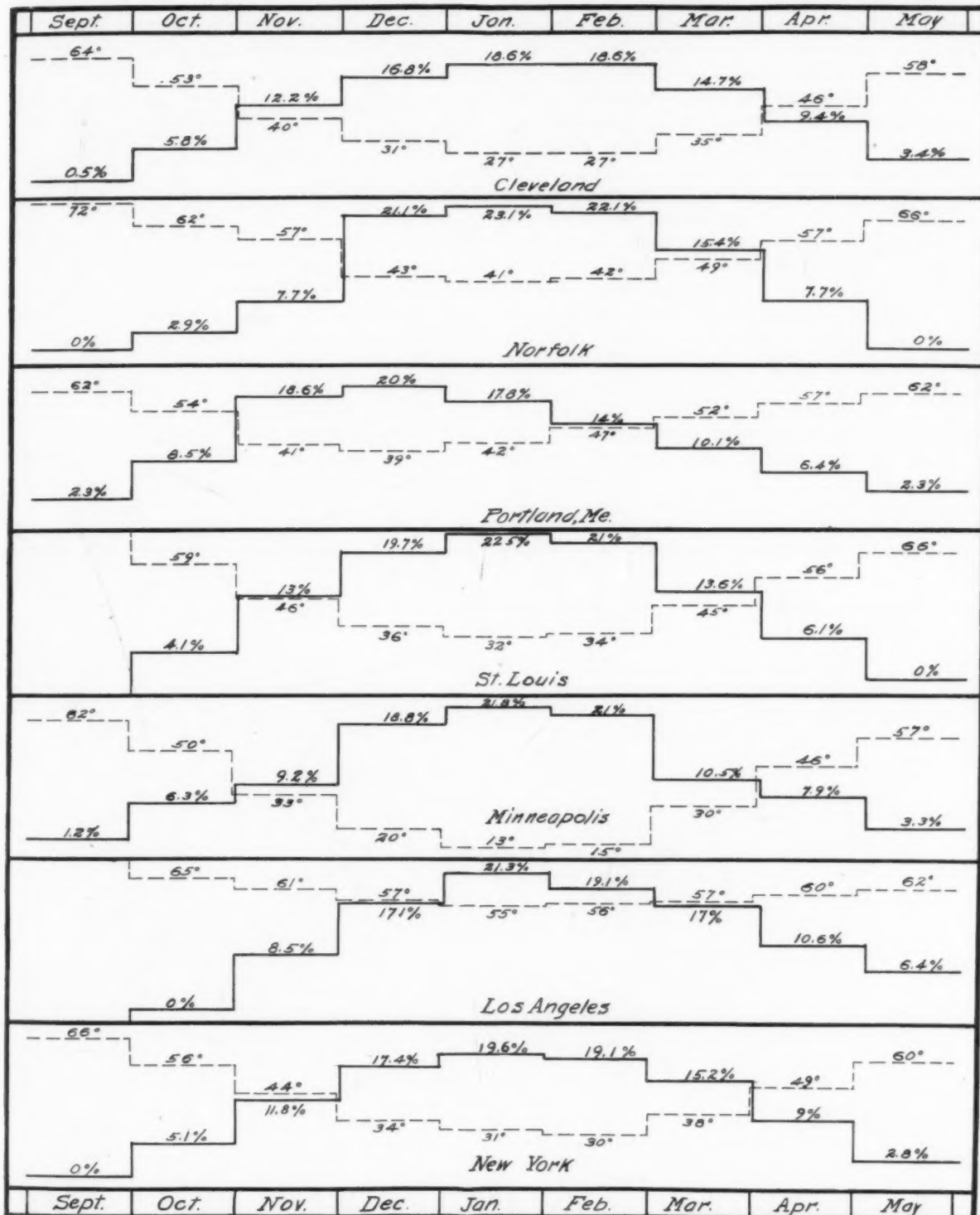


Fig. 3. Average Fuel Requirements for any Period for any Fuel Can be Determined from Charts. Solid Lines Show Percentages of Annual Fuel Requirements; Dotted Lines Show Average Mean Temperatures

than it would be to use 75 per cent, or any other figure, as a base. In the latter case the thoughtless individual might jump to the conclusion that 75 per cent was a fair average value, and thus derive a quantity well under what it should be. Reference to the iso-oil-consumption chart (Fig. 5) shows that for a heating load of 1,000 degree-days, and assuming a heating plant efficiency of 100 per cent, there will be required 0.686 gallons of oil fuel having a heating value of 140,000 B.t.u. per gallon; also it is assumed that steam radiators are under consideration, and that the radiation was designed for a 0° outside temperature and a 70° inside temperature.

It will be a simple matter to make fuel determinations after having followed through the solution of a typical problem. We will take Chicago as an example. What quantity of oil having 130,000 B.t.u. per gallon will be required to heat a house with 730 square feet of standing water radiation? (In Chicago radiation is figured on the basis of a minimum outside temperature of -10°.)

The average heating load, taken from the table on page 281, is 6,000 degree-days. There would be required, then, 6×0.686 gallons, or 4.11 gallons of oil having a heating value of 140,000 B.t.u. per gallon. Now, we will assume that the boiler in the house under consideration is a new

and first class unit, well adapted to the application of an oil burner. Under these conditions it is possible to attain a seasonal efficiency of 60 per cent. As a matter of fact, the selection of this "seasonal efficiency" figure is the real trick in the application of this method; a reasonable knowledge of heating plant operation will, however, aid in the judicious selection of this factor. It might be well to suggest that proper figures will range somewhat as these:

For gas-fired boilers....	65%—70%
For oil-fired boilers.....	55%—65%
For coal-fired boilers....	35%—50%

It will be noted that the range for oil and gas is less than for coal. This is due to the fact that fluid fuels are automatically fired and almost always thermostatically controlled. Consequently the operation of fluid-fired plants is more uniform than would be the case with a hand-fired fuel, in residence work. One important factor in bringing about the relatively high efficiency of gas and oil is the intermittent functioning of heating plants in which these fuels are used. Where coal is used it frequently happens, during the fall and spring, that a day or days will come on which no heat is wanted. But the coal fire continues to burn, producing heat that is not wanted; it is a

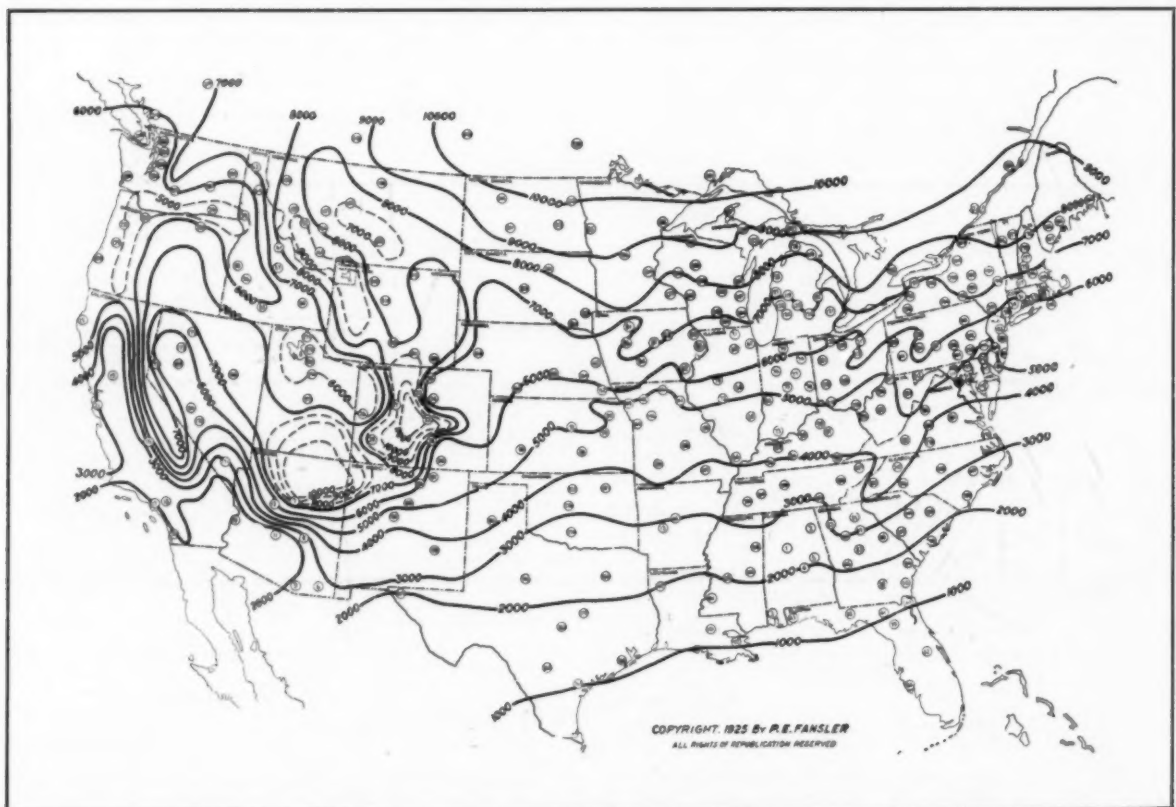


Fig. 4. Iso-Degree-Day Chart of the United States Showing Heating Loads in Degree-Days (See Tables on Pages 281 and 282 for Cities)

condition that warrants the conception of a plant's operating at what is *negative efficiency*.

But, to get back to our problem, allowing for an efficiency of 60 per cent instead of 100 per cent, there would be required—

$$4.11 \text{ gallons} \times \frac{100}{60} = 6.85 \text{ gallons}$$

per sq. ft. radiation per season.

We now must correct for the difference between the assumed heating value of the oil and that of the oil under consideration, and we have:

$$6.85 \text{ gallons} \times \frac{140,000}{130,000} = 7.38 \text{ gallons}$$

The heating plant was designed for minimum outdoor temperatures of -10° , instead of 0° , so we will have to correct for this design difference. The relative temperature differentials will be $70^{\circ} - 0^{\circ} = 70^{\circ}$ and $70^{\circ} - (-10^{\circ}) = 80^{\circ}$, so we have:

$$7.38 \text{ gallons} \times \frac{70}{80} = 6.46 \text{ gallons}$$

The last correction is due to the fact that water heating is specified rather than steam, and we have, as a factor, the ratio of the heat emission assumed for these media, or:

$$6.46 \text{ gallons} \times \frac{150}{240} = 4.04 \text{ gallons}$$

As there is a total of 730 square feet of radiation, the fuel requirement will be:

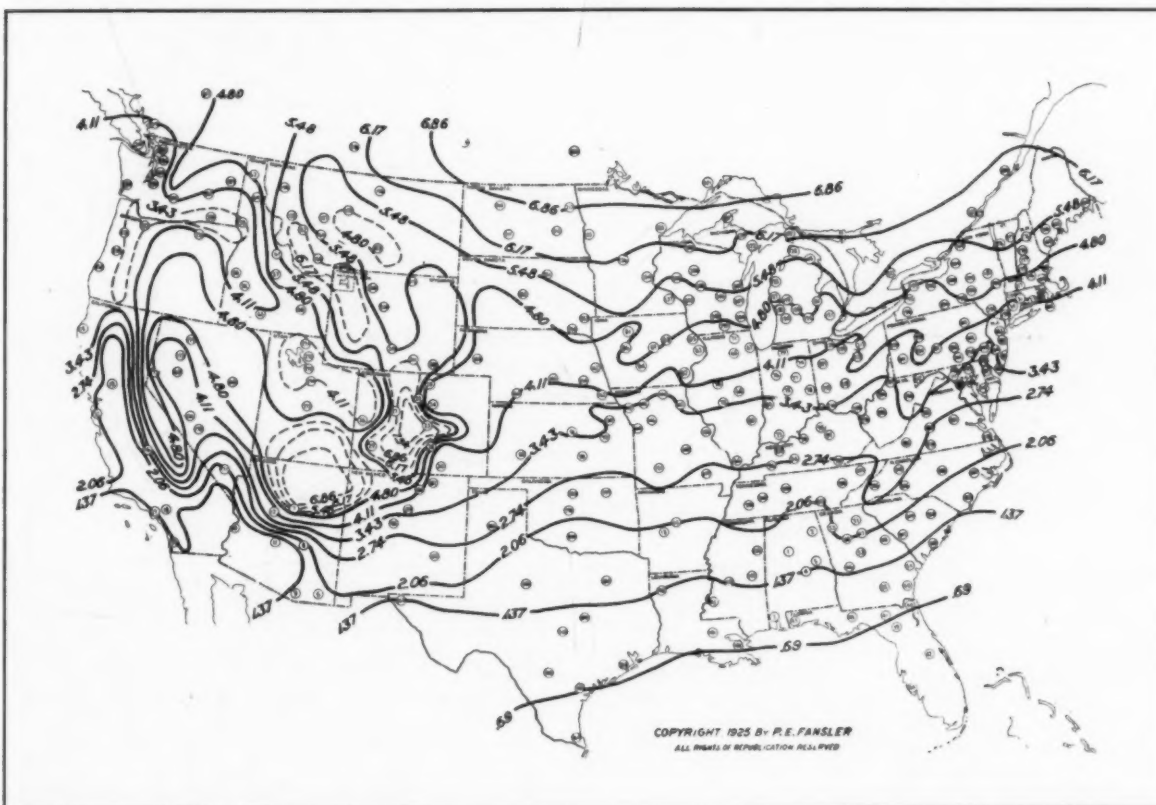
$$4.04 \text{ gallons} \times 730 = 2,949 \text{ gallons}$$

It will be seen that this process consists in applying to the base figure, as taken from the iso-degree-day chart, a series of corrective factors, each providing for variations from the assumed conditions. The operations are simple, and the entire calculation can be made in five minutes. Correspondence on this subject has brought out the question of possible error due to the fact that no account is taken of wind velocity. Such a correction should not be made, because if the radiation has been correctly determined, sufficient has been provided to take care of heat loss and infiltration due to windage.

Factors used in localities where radiation is calculated on outside temperatures other than 0° are:

For Minimum	Multiply By
-10°	$7/8$
0°	1
$+10^{\circ}$	$7/6$
$+20^{\circ}$	$7/5$
$+30^{\circ}$	$7/4$, and so on.

For minimum outdoor temperatures higher than that used as a base (0°), it is obvious that less radiation will be installed in a given room.



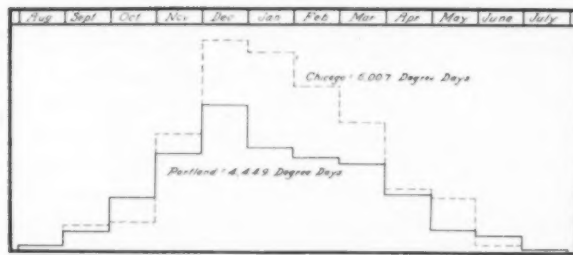


Fig. 6. Chicago Has a Shorter Heating Season Than Portland, Ore., But the Average Demand During the Four Winter Months is Much Greater

Consequently, the greater the quantity of fuel consumed to provide for a square foot of radiation per degree-day. If, then, unit figures for fuel are multiplied by the radiation quantity and by the number of degree-days, the total fuel requirements will be lower than would be the case were the same building located at a place where the base temperature is lower, the number of degree-days higher, and the total radiation greater.

Determinations for other fuels are easily made with the data:

Degree-Days	Gas, Cubic Feet ¹	Coal, Pounds ²
1,000	96	8
2,000	192	16
3,000	288	24
4,000	384	32
5,000	480	40
6,000	576	48
7,000	672	56
8,000	768	64
9,000	864	72
10,000	960	80

1. Correction should be made for gas variations:

Heat value assumed to be 1,000 B.t.u. per cubic foot.

Other corrections the same as those for oil fuel.

2. Correction should be made for coal variations:

Heat value of coal assumed to be 12,000 B.t.u. per pound.

Other corrections the same as those for oil.

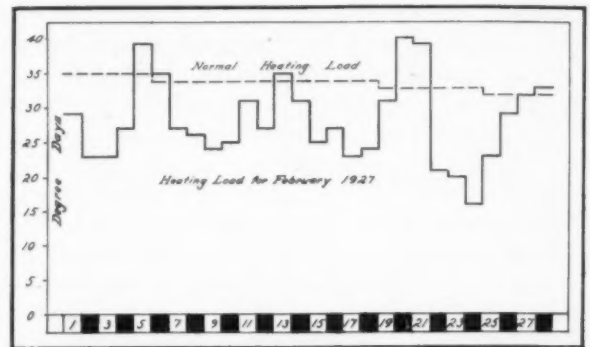


Fig. 7. Graph of an Unusually Mild February in New York. Heating Requirements Were Below Normal on all but Six Days

To indicate the accuracy that can be attained through the use of this method of pre-determining fuel consumption, I might cite a specific case. I was able to obtain exact data regarding the installed radiation in more than 100 homes in Chicago, and for each I computed the gas consumption in terms of cubic feet per square foot of installed radiation, correcting for the heating value of the gas supplied in Chicago,—535 B.t.u. It worked out to be 709.3 cubic feet. Through the courtesy of the local public utility company, I was afforded access to the meter records of the houses under consideration, and the total gas consumed divided by the aggregate radiation was 706.8 cubic feet. Thus the *computed* gas consumption varied from the *actual* consumption by only 1.5 cubic feet, or *less than 0.2 per cent*. This represented an error in the cost of heating these houses of less than \$1 per house. Oil burner salesmen and engineers have frequently told me that they had pre-determined oil consumption to within 50 to 100 gallons per heating season where the total consumption was from 2,000 gallons to 4,000 gallons. Thus the method is simple and accurate, and because of its adaptability to graphic presentation, it is eminently suited to the use of architects and engineers. On the page opposite and on the following page will be found a table of the average yearly heating loads, expressed in degree-days, for some 327 cities in the United States and Canada.

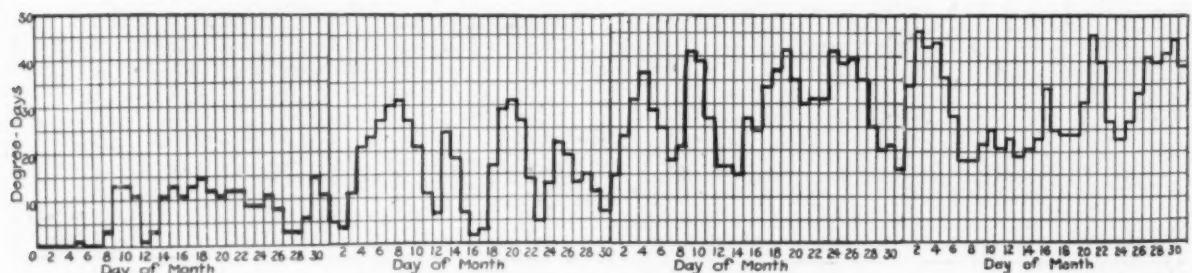


Fig. 8. Monthly Graphs Can be Plotted and Put Together to Show the Yearly Heating Load for Any Locality

HEATING LOADS IN DEGREE-DAYS, CITIES OF UNITED STATES AND CANADA

No.	Degree-Days	No.	Degree-Days	No.	Degree-Days	No.	Degree-Days		
ALABAMA				KANSAS					
1 Birmingham	2527	22 Boulder	5665	43 Pensacola	1288	89 Dodge City	5035		
2 Gadsden	3006	23 Colorado Springs	10089	44 St. Petersburg	175	90 Leavenworth	4795		
3 Mobile	1439	24 Denver	5880	45 Tallahassee	1421	91 Salina	5030		
4 Montgomery	1898	25 Fort Collins	6877	GEORGIA					
5 Tuscaloosa	2529	26 Grand Junction	5570	46 Americus	1862	92 Topeka	5282		
ARIZONA				47 Athens	2691	93 Wichita	4675		
6 Bisbee	2706	27 Leadville	11005	48 Atlanta	2880	KENTUCKY			
7 Flagstaff	10913	28 Pueblo	5671	49 Augusta	2173	94 Bowling Green	3883		
8 Globe	2575	29 Telluride	9372	50 Brunswick	1269	95 Frankfort	4241		
9 Nogales	2497	30 Trinidad	5439	51 Gainesville	3259	96 Hopkinsville	3846		
ARKANSAS				52 Macon	2220	97 Lexington	5250		
13 Hot Springs	2665	CONNECTICUT				98 Louisville	4366		
14 Little Rock	2861	31 Hartford	6124	53 Rome	3073	99 Middlesboro	3977		
CALIFORNIA				54 Savannah	1517	100 Owensboro	4179		
15 Eureka	5021	32 New Haven	6039	55 Waycross	1470	LOUISIANA			
16 Fresno	2375	33 New London	6040	IDAHO					
17 Los Angeles	1517	34 Waterbury	5661	56 Boise	5657	101 Baton Rouge	1206		
18 Pasadena	2066	DELAWARE				102 New Orleans	1044		
19 Sacramento	2525	35 Dover	4539	57 Challis	8074	103 Shreveport	2097		
20 San Diego	1582	36 Seaford	4507	58 Emmett	5587	MAINE			
21 San Francisco	3450	37 Wilmington	4813	59 Lewiston	4924	104 Eastport	8676		
DISTRICT OF COLUMBIA				60 Pocatello	6459	105 Gardiner	7537		
38 Washington	4562	FLORIDA				106 Lewiston	7502		
FLORIDA				61 Salmon	7866	107 Portland	7267		
39 Gainesville	791	62 Sandpoint	7357	MARYLAND					
40 Jacksonville	1080	63 Twin Falls	6600	108 Annapolis	4482	109 Baltimore	4591		
41 Lake City	955	64 Wallace	7228	110 Cambridge	4273	111 Frederick	4926		
42 Orlando	389	ILLINOIS				112 Frostburg	5613		
				65 Aurora	6661	113 Salisbury	4223		
				66 Cairo	4053	MASSACHUSETTS			
				67 Chicago	6007	114 Boston	6055		
				68 Decatur	5485	115 Lawrence	6682		
				69 Olney	4751	116 Lowell	6504		
				70 Peoria	6146	117 Springfield	6464		
				71 Rockford	6847	MICHIGAN			
				72 Springfield	5495	118 Alpena	8319		
				INDIANA					
				73 Evansville	3355	119 Big Rapids	7440		
				74 Fort Wayne	5927	120 Calumet	9217		
				75 Indianapolis	5331	121 Detroit	6202		
				76 Lafayette	5241	122 Escanaba	8904		
				77 Marion	5768	123 Frankfort	7590		
				78 Richmond	6060	124 Grand Rapids	6613		
				79 South Bend	6313	125 Greenville	7037		
				80 Terre Haute	4920	126 Lansing	6957		
				IOWA				127 Ludington	7185
				81 Algona	7594	128 Mackinaw	8461		
				82 Burlington	6261	129 Marquette	8866		
				83 Clinton	6628	130 Muskegon	6922		
				84 Des Moines	6464	131 Saginaw	7080		
				85 Dubuque	6744	132 Sault Ste. Marie	9707		
				86 Fort Dodge	6753				
				87 Marshalltown	7103				
				88 Waterloo	7152				

Fig. 9. A Monthly Heating Load Graph in Degree-Days.
This Forms Part "A" of the Yearly Graph Shown

(Continued on next page)

HEATING LOADS IN DEGREE-DAYS, CITIES OF UNITED STATES AND CANADA—Continued

No.	Degree-Days	No.	Degree-Days	No.	Degree-Days	No.	Degree-Days
MINNESOTA		181 Atlantic City	5250	230 Marshfield	4989	VIRGINIA	
133 Duluth	9650	182 Cape May City	4821	231 Pendleton	5148	278 Cape Henry	3478
134 Minneapolis	7953	183 Long Branch	5393	232 Portland	4449	279 Danville	3316
135 Moorhead	9495	184 Trenton	5033	233 Salem	4629	280 Lynchburg	3849
136 St. Cloud	8687					281 Richmond	3789
137 Winona	7515					282 Roanoke	4164
MISSISSIPPI		NEW MEXICO		PENNSYLVANIA		283 Staunton	4535
138 Aberdeen	2743	185 Albuquerque	4401	234 Altoona	6115	WASHINGTON	
139 Jackson	1920	186 Cimarron	5872	235 Clearfield	5994	284 Aberdeen	5325
140 Meridian	2527	187 Raton	5930	236 Harrisburg	5529	285 Bellingham	5994
141 Natchez	1667	188 Roswell	3399	237 Huntington	5771	286 Everett	5480
		189 Santa Fe	6064	238 Lancaster	5508	287 Lind	5790
MISSOURI		NEW YORK		239 New Castle	5932	288 Seattle	5156
142 Chillicothe	5017	190 Albany	6542	240 Philadelphia	4950	289 Spokane	6085
143 Hannibal	5303	191 Amsterdam	7494	241 Pittsburgh	5327	290 Tacoma	5218
144 Kansas City	5302	192 Binghamton	6882	242 Reading	5487	291 Walla Walla	4694
145 Kirksville	5799	193 Buffalo	6750	243 Scranton	6197	292 Yakima	5540
146 Marshall	5042	194 Elmira	6041	244 York	5423		
147 Poplar Bluff	3914	195 Ithaca	6917	RHODE ISLAND		WEST VIRGINIA	
148 Rolla	4671	196 Jamestown	6740	245 Block Island	5803	293 Charleston	3789
149 St. Joseph	5289	197 Lockport	6802	246 Providence	6111	294 Elkins	5813
150 St. Louis	4583	198 New York	5303	SOUTH CAROLINA		295 Huntington	4722
151 Springfield	4650	199 Norwich	7321	247 Aiken	2280	296 Parkersburg	4884
MONTANA		200 Ogdensburg	7592	248 Charleston	1770	297 Wheeling	5214
152 Anaconda	9158	201 Port Jervis	6310	250 Florence	2493		
153 Billings	6983	202 Rochester	6834	SOUTH DAKOTA		WISCONSIN	
154 Butte	8262	203 Syracuse	7269	251 Aberdeen	8709	298 Ashland	9066
155 Great Falls	7222	204 Watertown	7396	252 Pierre	7213	299 Beloit	6938
156 Havre	8608	NORTH CAROLINA		253 Sioux Falls	7683	300 Eau Claire	7973
157 Helena	7764	205 Asheville	4410	254 Yankton	7337	301 Green Bay	8201
158 Kalispell	8261	206 Charlotte	3153	TENNESSEE		302 LaCrosse	7309
159 Missoula	8324	207 Newbern	2580	255 Chattanooga	3099	303 Madison	7251
160 Virginia City	8682	208 Raleigh	3287	256 Jackson	3261	304 Milwaukee	7366
161 Yellowstone Park	9723	209 Wilmington	2493	257 Johnson City	3950	305 Oshkosh	7508
NEBRASKA		210 Winston-Salem	3904	258 Knoxville	3517	306 Prentice	8765
162 Falls City	5197	NORTH DAKOTA		259 Nashville	3550	307 Sheboygan	7384
163 Grand Island	6084	211 Bismarck	8498	260 Perryville	3414	308 Wisconsin Rapids	8030
164 Lincoln	6231	212 Grand Forks	9724	TEXAS		WYOMING	
165 McCook	5801	213 Jamestown	8825	261 Abilene	2610	309 Cheyenne	7360
166 North Platte	6479	214 Minot	9591	262 Amarillo	4655	310 Cody	7769
167 Omaha	6127	OHIO		263 Austin	1578	311 Laramie	8814
NEVADA		215 Akron	6188	264 Brownsville	319	312 Rawlins	8080
168 Eureka	7072	216 Cincinnati	5302	265 Corpus Christi	886	313 Sheridan	8113
169 Fallon	5676	217 Cleveland	6096	266 Dallas	2455	314 Thermopolis	7489
170 Goldfield	5556	218 Columbus	5426	267 El Paso	1912		
171 Las Vegas	2827	219 Dayton	5341	268 Galveston	1050	CANADA	
172 Lovelock	5710	220 Ironton	4636	269 San Antonio	1362	315 Victoria, B. C.	5777
173 Reno	5894	221 Lima	6051	270 Waco	1838	316 Vancouver, B. C. ...	5976
174 Tonapah	6069	222 Sandusky	5998	UTAH		317 Kamloop, B. C.	6724
175 Winnemucca	6266	223 Toledo	6107	271 Logan	6750	318 Medicine Hat, Alb. ...	8152
NEW HAMPSHIRE		OKLAHOMA		272 Manti	6826	319 QuAppelle, Sask.	11261
176 Berlin	8867	224 Ardmore	2374	273 Ogden	5848	320 Winnipeg, Man.	11166
177 Concord	7335	225 Guthrie	3388	274 Provo	6184	321 Port Arthur, Ont.	10803
178 Franklin	7537	226 Oklahoma City	3827	275 Salt Lake City	5358	322 Toronto, Ont.	7732
179 Keene	7338	227 Tulsa	3497	VERMONT		323 Montreal, Que.	8705
NEW JERSEY		OREGON		276 Burlington	8123	324 Quebec, Que.	8628
180 Asbury Park	5390	228 Doraville	5527	277 St. Johnsbury	8176	325 Fredericton, N. B. ...	9099
		229 Eugene	5588			326 Yarmouth, N. S.	7694
						327 Charlottetown, P.E.I. ...	8485

✓ THE CLIENT, THE ARCHITECT AND THE CONTRACTOR

PART III—THE CONTRACTOR

BY
CLINTON H. BLAKE

IN the two preceding articles of the present series, we have discussed successively the problems and attitude of the architect and the problems and attitude of the owner. It remains now to consider the contractor. No building operation can be carried to a successful, happy and effective conclusion unless the rights, liabilities and point of view of the contractor are looked at in their proper perspective, and are appreciated and understood. The good will and bona fide coöperation of the contractor are just as necessary as the bank account of the owner and the ability and services of the architect.

It may be said in general that the contractor's relations to the project are three-fold,—his relations to the owner, his relations to the architect, and his relations to his subcontractors, employees and material men, as the case may be. The relations between the contractor and the owner are primarily those of one business man to another. So long as each of them is honest and capable and fair-minded, it is probable that there will not be any disagreements or difficulties. The owner is usually a business man, and between him and the contractor there are not the same possibilities for misunderstanding as in those which are inherent in the relations between owner and architect.

The relations between the contractor and the owner will be affected somewhat by the nature of the contract. If it is a cost-plus contract, considerations will arise which will not be involved in a fixed-price contract, and vice versa. It is fair to say, I think, that on a cost-plus contract the owner usually feels that the contractor will probably not injure himself in his efforts to keep down the cost. This feeling results, perhaps, from business cynicism. It comes probably more, however, from the fact that in some cases contractors undoubtedly are not very careful as to expenses in cost-plus work,—at least within the limits set up by the maximum cost guarantee,—if such a provision be included in the contract. It is, of course, unjust for any owner to feel that contractors in general are unwilling to give him as conscientious service on a cost-plus as on a fixed-price contract. Given a thoroughly honest and conscientious contractor, the owner will in many cases fare better on a cost-plus arrangement than where the contractor is forced to put in a fixed bid and, in so doing, naturally discounts various possibilities for loss and adds sufficient margin to cover them. On the other hand, there is no doubt that contractors in some cases have taken advantage of owners on

cost-plus work, and that, even without any bad faith on the part of the contractor, the work on these projects has not been speeded up by those in direct charge, as it would have been, had the work been carried on for a fixed fee.

While it may seem paradoxical, it is the fact, nevertheless, that the feeling of suspicion held by many owners as to cost-plus work may be turned to distinct advantage by honest and capable contractors. The owner who expects to be taken advantage of on a contract of this kind will be the first to react favorably when he finds that the contractor is giving him a square deal and doing his best to save him money. The contractor who does this will make a firm friend of such an owner and receive from him free advertising worth many times the additional compensation which the contractor might have received if he had not handled the work as conscientiously as he did. Many of the larger building concerns are fully alive to this situation and have built up and are building up day by day an extraordinarily valuable good will by the simple process of pleasantly surprising their clients in the results secured.

Where the contract is on a fixed-price basis, the situation is changed. Under these conditions, the contractor will not have any incentive to delay the work or add to the cost, but rather to expedite it and keep down the cost as much as possible. In this case the suspicious owner is looking, therefore, for skimmed work rather than unnecessary work. There is introduced under this form of contract, also, a new element and one which may be very troublesome,—namely, the matter of extras. There is nothing which will more quickly and completely wreck the good will existing between the contractor and the owner than claims for extra work not covered by the original contract. Even where these claims are bona fide, the owner will many times feel that they are unfair and that they should have been covered by the contract price. It is in the interests of a sound and permanent understanding between the parties that the contract in the first instance be as complete as possible. It is never possible completely to avoid extras; at least, I do not now remember any instance where some extras were not necessarily involved. There is no doubt, also, that some unscrupulous contractors make it their practice to put in low bids and make up their profit in the form of extras. If the contract and specifications are not carefully worded, the contractor is often presented with an excellent op-

portunity to do this and still be within his strict legal rights. The result will mean additional profit for him on that particular contract, but it will not aid him in building up the good will and prestige which are, in the long run, of vastly more advantage to him. On the other hand, it is no less true that the owner in many cases is entirely unreasonable as to extras which are properly claimed. It is also true that the honest contractor often loses a contract to a more unscrupulous competitor, because the latter has under-bid him, trusting to extra claims to offset the difference.

The architect can be of special service to both the contractor and the owner in meeting this situation. By his experience he is far better fitted than the owner to foresee the difficulties ahead and to prevent them so far as possible. One of the greatest services which he can render to the owner and to the high-class contractor alike is to make the specifications and contract so definite and comprehensive in the first instance that extras are, so far as possible, eliminated. Where this is done, it is correspondingly difficult for the unscrupulous contractor to take advantage of the situation and unfairly to under-bid his honest competitors. The reduction in the number of extra items works a corresponding reduction in the opportunities for misunderstanding and dispute. As a matter of sound business, therefore, as well as a matter of sound ethics, the contractor will do well to coöperate in seeing that the specifications and contract cover as nearly as is practical all of the work required for the completion of the work and that the possibilities of extras are reduced to a minimum. Where the contract is not complete in this respect, and extra work is made necessary, the contractor is, of course, entitled to be paid for it and to stand upon his rights in this respect. He will find it distinctly to his interest, however, in the long run to so handle the situation as to make clear to the owner his desire to be fair and to remove any suspicions that he is claiming, in the guise of extras, any additional payments to which he is not fairly entitled. A contractor whose attitude is obviously fair and liberal in this respect will be the contractor to whom the architect and the owner will give preference in future work.

I have had an excellent illustration of this within the last few weeks. About a year ago, an owner employed a contractor with whom he had not theretofore dealt. The project was not easy, as it involved alterations and was, therefore, peculiarly adapted to "extra" claims. The contractor proceeded with the work promptly and efficiently. There were many items where the owner rather expected that extras would be asked and for which indeed he was prepared to pay reasonable costs. The contractor knew of the owner's at-

titude and knew that if he put in a claim for extras it would be honored. He nevertheless voluntarily disregarded this opportunity and included many of these items in the contract price. The result was that the owner was tremendously pleased and that he became a real and enthusiastic "booster" for this particular contractor. Within recent months the same owner has had another project on which bids were submitted by many high-class contracting firms. Some of them were lower than the bid submitted by the contractor who had done the previous work. There was no reason to think that the lower bidders were not responsible and conscientious. The owner, however, did not hesitate for a moment, but promptly reemployed the same contractor, giving him a contract several thousand dollars higher than the contract which he could have secured from others. The additional profit which the contractor will secure in all probability under this second contract will amount to far more than the aggregate amount of the extras which he might have secured, had he so wished, on the first project. This is a typical and practical example of the investment value of convincing the owner that he will have fair treatment, few extras, and real coöperation in keeping the cost within his limits.

Another situation with which the contractor is often confronted is that in which the contract drawings or specifications, through carelessness, mistake or otherwise, do not properly provide for the work. This situation is often, but not necessarily, related to the question of extras. However that may be, there is no question but that the duty of the contractor is to bring to the attention of the architect or the owner the discrepancies or mistakes involved. It will probably be more tactful for him to bring them to the attention of the architect in the first instance. This will give the architect an opportunity to correct them himself and will not give him the feeling that the contractor has been officious or has gone over the head of the architect in taking up the matter with the owner. If it is not possible or practical to consult the architect to have the corrections made in this way, it is then the duty certainly of the contractor to consult the owner. By saying that this is a duty, I do not mean that it is necessarily a legal duty. It is clearly, however, the right course for him to follow. More than this, it is distinctly the course most to his advantage. If the contractor, knowing that omissions have been made, inadvertently proceeds with the work and, when the situation later develops, demands extras for the changes or additional work resulting from them, he will secure some temporary benefit undoubtedly from the extra allowance. The architect will usually feel, however, that he should

have been consulted, and the owner will feel that someone is to blame and will probably place the blame upon both the architect and the contractor.

Some contractors incur criticisms by subletting practically the entire work and then losing interest in it, being assured that they are protected under their subcontracts.

This is an especially aggravating situation from the point of view of both the owner and the architect. If the general contractor undertakes the work, the owner is entitled to look to him as the responsible party and to expect him to give it real attention. There are many contractors, without doubt, however, who in the true sense of the word are not engaged in building operations themselves, but who merely take contracts, sublet all the work, and include a profit for themselves. Architects are not partial to contracting organizations of this character. They feel, and rightly, that the contractor who takes an active part in the building work through his own organization, will give fair attention and far better coöperation. Even if, in a given case, the contractor sublets the greater part or all of the work, he will do well, in the interests of the good will of the architect and the owner, to evince a continuing and effective interest in the work done and a proper supervision of his subcontractors and material men.

The attitude of the contractor toward the architect is usually very complimentary to the latter. The contractor is either suspicious of the architect and his abilities or he follows the other extreme in his reliance upon him. In the great majority of cases, the contractor's inclination is to rely upon the architect to protect him and see that is not taken advantage of under the contract. It is natural that the contractor should have a very definite feeling of either trust or distrust toward the architects with whom he works. The architect is in a position to be of great help to the contractor or to cause him considerable difficulty and loss. If the architect is unfair or not capable or experienced, he can very easily cause the contractor to lose his expected profit and considerably more, in addition. On the other hand, if, as is usually the case, he is experienced and conscientious and capable, he can be of great assistance to the contractor in interpreting the latter's attitude to the owner and the owner's attitude to the contractor, in promoting a harmonious handling of the operation and in protecting the rights of the contractor where it is proper and necessary that he should do so. We have noted briefly in another connection the position of the architect as arbitrator. His powers as such have many ramifications. The architect does not always himself realize how often and on how many questions he is called upon to decide judicially be-

tween the owner and the contractor. Many of these decisions are made casually and accepted without question by the parties concerned. Some of them are more formal and difficult. The architect again and again is called upon to hold the scales as between his client and the contractor and to do justice between them. This may be in connection with his interpretation of the drawings and specifications; it may be in connection with the condemnation of work or the issuance of certificates or the approval of extras.

So far as the contractor is concerned, it is a practical necessity that he should rely, whether he wishes to or not, upon the ability and good faith of the architect. The status of the architect is necessarily such that, in order to make his employment and work effective, he must be and is endowed with powers which, if improperly exercised, would be very harmful to the contractors. This has been recognized as a necessary condition. The tendency for some years has been to cut down somewhat the power of the architect in this connection and to limit his purely discretionary and arbitrary powers and throw open the door to arbitration on various points, which formerly might have come to him for sole decision. There remains, however, sufficient discretionary power in his hands, so that the contractor has a real interest in the choice of the architect. If the architect does not know his business or is not sound in his practice and sensible in the conduct of the work, the contractor would much better not undertake the contract. On the other hand, if the architect is experienced, fair and reasonable and has a reputation for doing the right thing by contractor and client, the contractor is reasonably safe in entering upon the work, even if the contract gives wide discretionary powers to the architect.

In the last analysis, the contractor must depend, and does depend, upon the good faith, fairness and ability of the architect. That there are very few cases in which any objection is made to the architect by the contractor indicates how well this dependence is justified and is a real compliment to the architectural profession. A wise contractor will argue the terms of the contract before it is signed, and not afterwards. If there is any question which is not entirely clear or if any ambiguous provisions are inserted or if there are some points which are not covered, he will bring these to the attention of the architect or the owner, before the contract is signed. It is true that many contractors are not diligent in this respect and that some even knowingly enter into ambiguous contracts with the thought that the ambiguities may result in benefit to them, in promoting opportunities for extras and in making possible additional compensation and claims. This is un-

doubtedly the result in some cases. In the long run, however, the contractor who does his talking and arguing beforehand and not afterwards is the one who will succeed and build up real prestige. No owner and no architect care to deal many times with a contractor who is constantly wrangling over the terms of his employment and their interpretations. They much prefer to deal with one who may be a shrewd bidder and, if one will, "fussy" in the framing of the contract in the first instance, but who stands by it and by its terms and by the architect's interpretation of it, after it has become effective.

There is some misapprehension in the minds of contractors with regard to their authority in emergencies. Some have the idea that in any emergency they are authorized to act on their own initiative. This is not necessarily true and is not a safe rule for them to follow. If an emergency arises where there is no possibility of consulting the owner or the architect, the contractor necessarily must act as he thinks best and necessary. On the other hand, if the emergency is not so acute and if it is possible to consult the owner or architect, this should be done. It should be done, not only in the interest of the owner, but in the interest especially of the contractor.

The contractor will do well, also, to have in mind the limits of the architect's authority in the matter of changes and the authorizing of extras. It is natural that where the architect gives definite, verbal directions regarding the work, the contractor should follow it. Such directions are given constantly and constantly obeyed without any unfortunate results. This is because, however, the owner, in effect ratifies the action of the architect and raises no question regarding it. I have already pointed out some of the limitations of the architect's authority as an agent. The contractor is interested in these limitations, fully as much as the architect or the owner. In fact, his interest is probably greater. If he proceeds with work and incurs expense on a verbal authorization, which the architect has no power to give, and in which the owner does not back up the architect, the contractor will face a serious loss in consequence. Wherever possible, the contractor will do well to have these directions of the architect confirmed in writing and, if the directions are such as to entail substantial changes or additions in the contract, he will do well to ask that they be confirmed in writing by the owner. Of course, if the construction contract provides that the contractor may honor any directions given by the architect for changes or additions, this latter precaution may not be necessary. The contract provides, more often, however, that such changes

shall be approved in writing by the owner. The clauses in the contract dealing with this point are of vital interest to the contractor and should be borne in mind by him, especially in negotiating and executing the agreement.

On the whole, the architect and the contractor probably understand each other better than do the owner and architect or the contractor and owner. The contractor, from long association with architects, appreciates the position which they occupy in the building world and their functions and limitations. The architect, from his association with builders, understands the problems which confront the contractor and, without any lessening of his loyalty to his client, is able to take a sympathetic view of many of the contractor's difficulties. The owner and contractor and the owner and architect have direct contractual relations. There are no such relations between the architect and the contractor. This, perhaps, is one reason why there are fewer serious misunderstandings between them. On any building project, coöperation is the real essential. The architect and owner can do little without the coöperation of the contractor. The contractor needs their coöperation. In some cases it will be lacking because one of the parties is inclined to be unfair or unreasonable. In a great majority of cases, however, if lacking, it will be absent because of a lack of understanding on the part of architect, owner or contractor. As I indicated at the commencement of these articles, this understanding is the real essential. The architect is in an excellent position to promote mutual understanding. He can interpret the contractor's position and problems to the owner and he can interpret the problems and point of view of the owner to the contractor. In so doing, he will not render a general service alone. He will be making smooth, also, his own path, diminishing the chances of friction and misunderstanding on the work, increasing the prospect that his client will be wholly satisfied, and strengthening the foundation upon which the permanence of his own prestige and the good will of his practice and organization depend. The American Institute of Architects has, as an organization, done valuable work along these very lines. Its standard forms of agreements alone are a considerable accomplishment. It is not an easy matter to draft a contract which is satisfactory and fair to owner and architect and contractor alike. The Institute and similar architectural associations may well take pride in the part which they have played, and are playing to an increasing extent, in eliminating misunderstandings and points of friction and promoting coöperation and good will and understanding throughout the building operation.

AERIAL DRAFTING

BY
H. G. HALL

THIS title does not refer, as might be supposed, to the familiar publicity method commonly called "sky writing," but refers to the pictorial presentation of objects as viewed from the air. The increasing airmindedness and the increasing familiarity of the general public with the appearance of the ground and of objects on the ground as viewed from airplanes, raise a question as to the best method of making and presenting perspective drawings, giving what used to be called "bird's-eye" views. This question is of timely interest to architects, as the very same

developments which have made accurate presentation more important have also increased materially the general usefulness of air views of great varieties of subjects, — towns, cities, housing developments, buildings, groups of buildings, airports, to mention a few.

The methods universally used for making perspective projections from plans or maps require projection of the subject upon a vertical picture plane. These methods produce satisfactory results in all usual cases when the viewpoint is close to the ground, or when the picture plane is nearly perpendicular to the line joining its center with the viewpoint, because the objects are thus pictured in substantially the same proportions and relations as if viewed by the eye or recorded by the camera. When, however, objects are seen or recorded from a viewpoint at a great distance above the ground, the retina of the eye and the plate of the camera are usually tilted far from the vertical, and the perspective drawing of the same view, projected on a vertical picture plane, seems to show serious distortion. Increasing familiarity with airplane views increases the seriousness of this distortion, and although a

true view can be obtained of such perspective drawings by tilting them to the proper angle to the line of sight, it is quite impossible to expect this to be done by the usual reader.

Another method sometimes employed in making perspective drawings of objects covering large horizontal areas consists of photographing the plan at the desired angle, thus securing directly the desired perspective projection of the plan, and then sketching in on the photograph all lines of the picture which lie outside of this plane. By this method, however, it is impossible to obtain

accurate representation of any of the objects portrayed except only those portions which lie in the plane of the plan, i.e. horizontal.

Without the use of the camera it would, of course, be entirely impracticable to project a drawing on a picture plane which is not vertical. While it would be possible to do so, the labor involved in calculating a different proportion for the projection of each point would be prohibitive. It is, however, a comparatively simple matter to make the

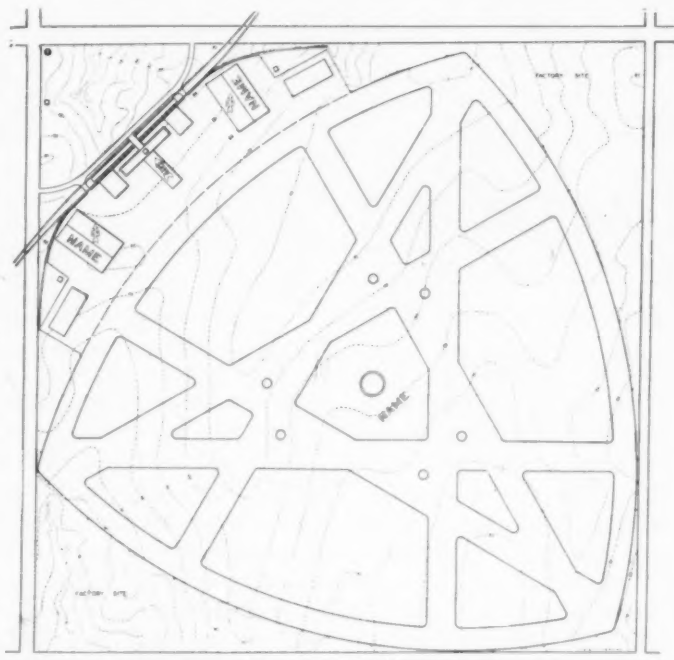


Fig. 1. Plan of the Airport Shown in the Perspectives, Figs. 2 and 3

drawing in the usual manner, projecting it on a vertical picture plane, and then to correct the distortion by photographing the original drawing tilted so as to form the proper angle with the camera plate, or vice versa. The resulting photograph when viewed directly will show the picture as it would be seen from the air.

The illustrations accompanying this article show how this method has been carried out with a perspective drawing of an airport. Fig. 1 shows a plan drawing of the airport design, with landing field, runways, buildings, etc., in simple outline. Fig. 2 shows the perspective drawing of this airport, projected in the usual manner from the plan to a vertical picture plane and repro-

duced. The illustrations show how this method has been carried out with a perspective drawing of an airport. Fig. 1 shows a plan drawing of the airport design, with landing field, runways, buildings, etc., in simple outline. Fig. 2 shows the perspective drawing of this airport, projected in the usual manner from the plan to a vertical picture plane and repro-



Fig. 2. Usual Aërial Perspective, Showing Apparent Distortion

duced from a normal photograph. The apparent distortion is quite obvious, particularly when it is realized that the site enclosed by the four boundary roads is almost exactly square and that the landing field and its runways have complete triangular symmetry, as is shown clearly in the plan. To get a true view of this picture, the illustration must be held at the proper distance from the eye and at an angle of about 57 degrees with the line joining the center with the eye. Fig. 3 shows the same perspective drawing, reproduced, however, from a photograph taken with the drawing tilted at an angle of about 33 degrees from the plane of the camera plate. The dis-

tortion has been corrected, and when viewed directly the airport now appears in its proper proportions. The diagrams in Figs. 4, 5, and 6 show the method which was followed. Fig. 4 shows the relation between the airport, the viewpoint, and the vertical picture plane as assumed in making the original perspective drawing. Fig. 5 shows the relation between the airport, the camera lens, and the tilted camera plate as they would be placed in taking a similar picture from the air. The angle between the picture plane of Fig. 4 and the camera plate of Fig. 5 gives the angle to which the drawing was tilted in relation to the camera plate when photographed to correct

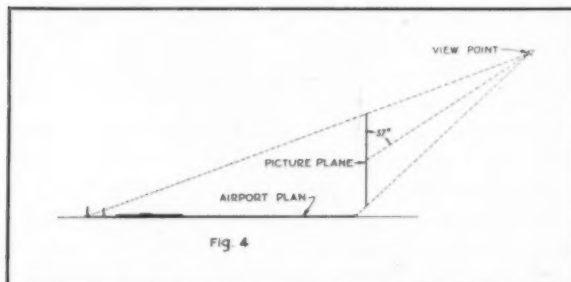


Fig. 4. Diagram of Relation of Plan, Picture Plane and Viewpoint Used for Fig. 2

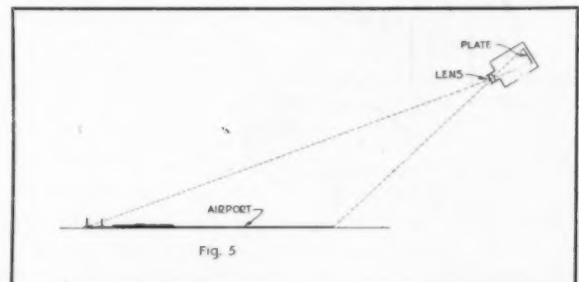


Fig. 5. Diagram of Relation of Plan to Picture Plane When Photographing From the Air

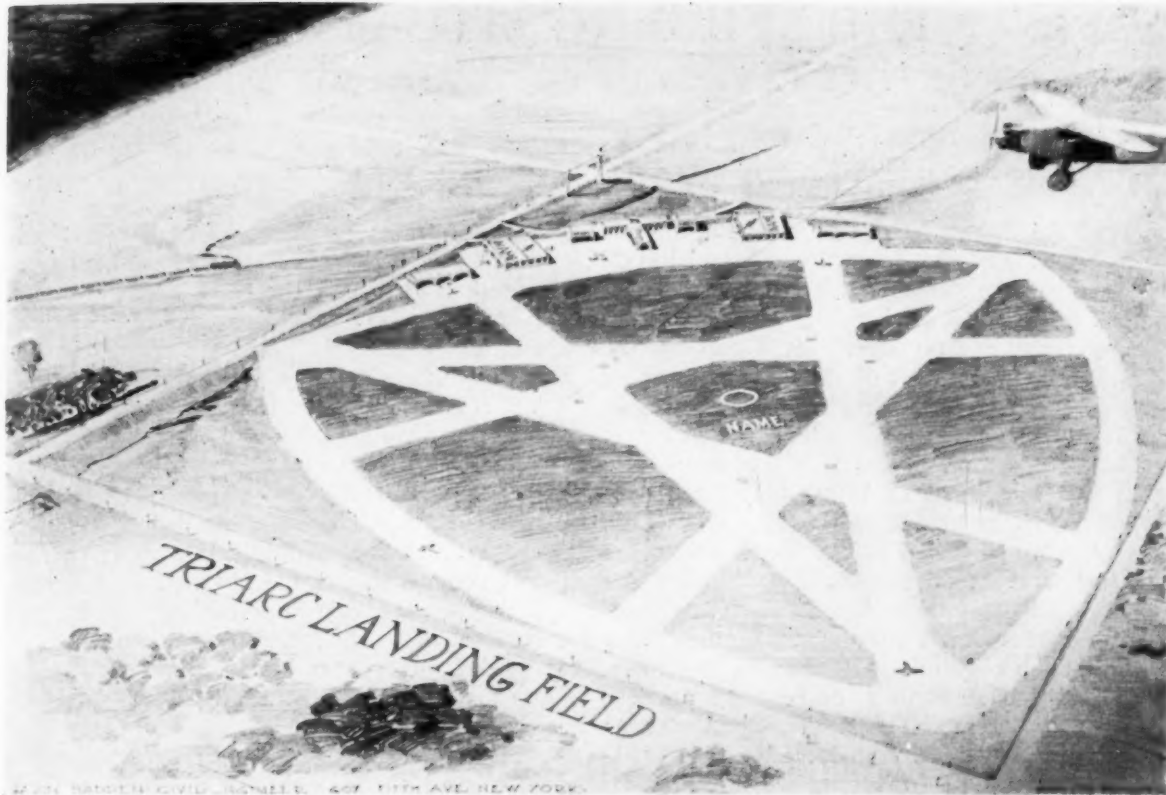


Fig. 3. Aerial Perspective Photographed, as Explained, to Correct Distortion

the distortion, as shown in Fig. 6. This angle was in this particular instance about 33 degrees.

No special camera or apparatus was used in photographing this drawing, and therefore parts of the photograph reproduced in Fig. 3 are slightly out of focus, as can be seen from careful inspection and comparison with the illustration from the normal photograph. The lower and nearer portions of the picture are given in sharp definition, while the upper and farther portions are slightly out of focus. Although sharp definition throughout could readily be obtained if the camera were especially equipped for the purpose, using perhaps a pinhole lens, there is no disadvantage in this case, and the slight loss of sharp definition perhaps makes the view even more in-

teresting and realistic; in a real view, the edge of the wing cutting off the upper left hand corner of the picture, and the fast-moving plane in the upper right hand corner would naturally be out of focus, while a hazy atmosphere would naturally cause a slight blurring of the more distant parts of the view. The principal features of the picture, which is particularly well suited for bringing out the distortion produced by the usual methods, include a new type of landing field and a new system of runways which show the most efficient and economical method of development on a square or nearly square airport site. The maximum lengths of runways are obtained with the minimum amount of runway surfacing, due to the intersections.

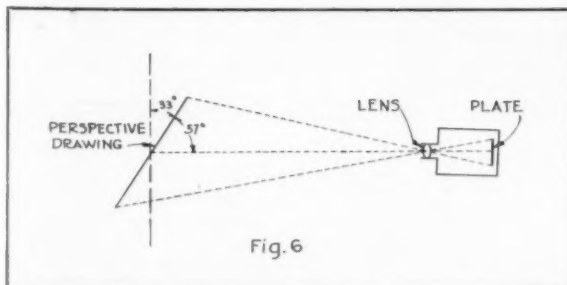


Fig. 6. Relation of Perspective Drawing to Plate to Make Correction Shown in Fig. 3

EDITOR'S NOTE. *The perspective drawing used to illustrate this method of corrected drafting was made in the office of Gavin Hadden, Civil Engineer, New York. It was rendered by Floyd Yewell, and the photographic work was done by J. Dreyer under the direction of C. A. Holden, of Mr. Hadden's office.*

THE BUILDING SITUATION

A MONTHLY REVIEW OF COSTS AND CONDITIONS

DECEMBER, 1928 brought to a close the high record year in the history of the country's building construction, according to the reports of the F. W. Dodge Corporation. Figures covering contracts let during the year in the 37 states east of the Rockies, which constitute 91 per cent of the active construction area in the United States, show a total value of \$6,628,286,100. This figure exceeds that of the previous year by approximately 5 per cent and is 4 per cent above the 1926 figures, the previous high record.

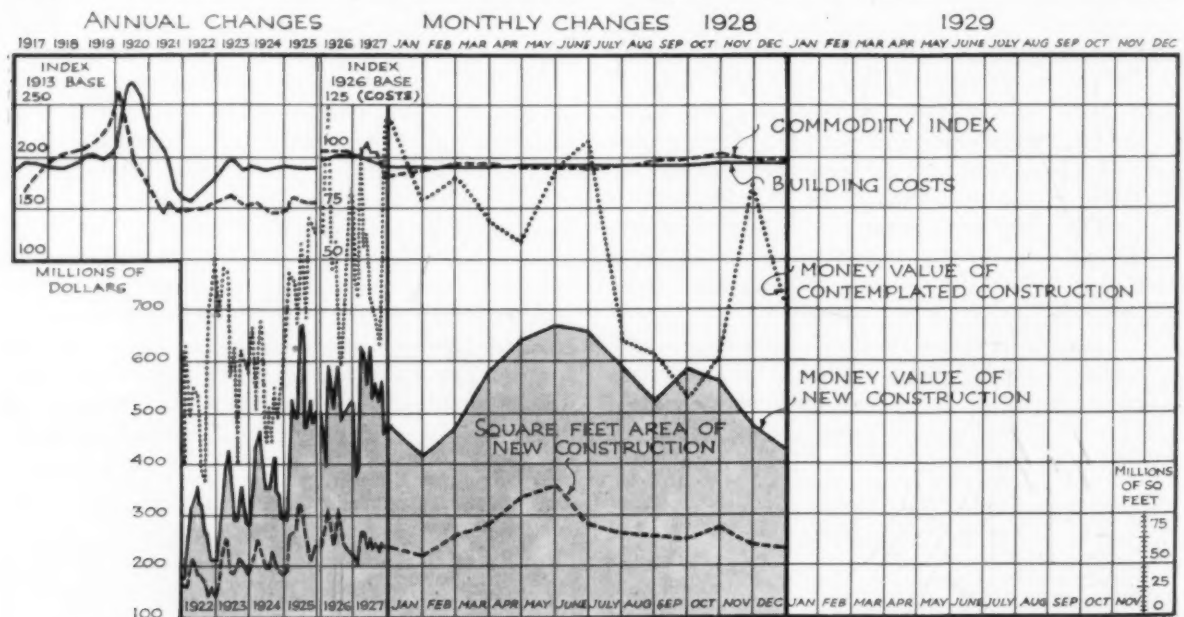
This record for the year 1928 was attained in spite of a fairly decided falling off of contracts let during December. The total for this month was reported as \$432,756,300, which was 8 per cent below the total for November and 9 per cent below that of December, 1927. The district which includes New York and also northern New Jersey is the only one in which the December, 1928 record exceeds those of both the previous month and December, 1927. The total contract figures for this district amounted to \$138,340,700, an increase of 2 per cent over the previous month and 7 per cent over December of 1927.

In the Northwest the sharpest decline of any

section was noticeable. The December, 1928 total was 34 per cent below that of November, and 74 per cent below the previous December. In the Central West, contracts fell off 27 per cent from December, 1927, and 11 per cent from November, 1928. In the New England states, the total contracts let amounted to \$28,222,900, which was 8 per cent below the value for November and 9 per cent below that month in 1927.

The chart below indicates that the money value, and also square foot area of construction contracted for during December, are about on a par with the low points for the year. The contemplated construction is somewhat below the average for the year, but considerably above the low points reached during the last half of the year.

It will be noted that in portraying building cost trends in this chart, the year 1926 has been adopted for the index base. This constitutes a more logical "normal" than did 1913, inasmuch as it is more nearly typical of the present economic era and is being generally adopted by economists as the key year for indexing purposes. The commodity index is that developed by *The Analyst*, a source of reliable data on building.



THESE various important factors of change in the building situation are recorded in the chart given here: (1) *Building Costs*. This includes the cost of labor and materials; the index point is a composite of all available reports in basic materials and labor costs under national averages. (2) *Commodity Index*. Index figure determined by the United States Department of Labor. (3) *Money Value of Contemplated Construction*. Value of building for which plans have been filed based on reports of the United States Chamber of Commerce, F. W. Dodge Corp. and *Engineering News-Record*. (4) *Money Value of New Construction*. Total valuation of all contracts actually let. The dollar scale is at the left of the chart in millions. (5) *Square Foot Area of New Construction*. The measured volume of new buildings. The square foot measure is at the right of the chart. The variation of distances between the value and volume lines represents a square foot cost which is determined, first by the trend of building costs, and second, by the quality of construction.

SANITARY DESIGN IN MODERN BUILDINGS

MISCELLANEOUS SERVICES

BY

HAROLD L. ALT

CLOSELY associated with the cold water supply are the fire-protection or standpipe service, to which all fire hose is connected, and the automatic sprinkler system,—if any. There is considerable variation in practice concerning the location of standpipes, various fire departments having different ideas. Where smoke or fire towers are built into a building, there are usually 2½-inch firemen's valves placed in the towers from standpipes located somewhere near the towers, and 1½-inch hose outlets and hose are placed in the corridors. In other cases it may be permitted to eliminate the 2½-inch valves in the fire towers and to install 2½-inch valves at the hose racks and removable reducers to come down to the 1½-inch size of hose.

Standpipes. In theory, standpipes in a building are for two purposes only,—the first, for the emergency use by the building occupants before the arrival of the firemen, and the second, for the use of the fire department. The number of standpipes should be sufficient for reaching any part of the building with a hose not exceeding 50 feet in length and not over 1½ inches in diameter. Hose racks having 75-foot and 100-foot lengths of hose

are sometimes used, but these are poor in practice as everyone who has seen the occupants or even the operating force of a building actually try to use a fire hose in a real fire will agree. Such a fire generally flares up suddenly and unexpectedly; a commotion ensues, everyone becomes excited, the hose is pulled off the rack where it has probably been packed tightly for months, it falls in kinks and is only partially straightened out; some of the many kinks remain, water is turned on at the valve, but the nozzle remains dry. Finally the last kinks are straightened out and water flows, but much valuable time has been lost at the most critical time. The longer the hose, the more kinks there are to be straightened out and the more difficult it is for inexperienced users to handle it. Hence the recommendation of the 50-foot length. This does not mean, however, that the distance from the standpipe to the farthest part of the building must not exceed 50 feet, as the length of the stream from the hose must also be considered, so that it may be said a 50-foot hose will cover a distance of 70 feet from the standpipe provided that the last 20 feet are in a straight line. The hose may be run around a corner, but

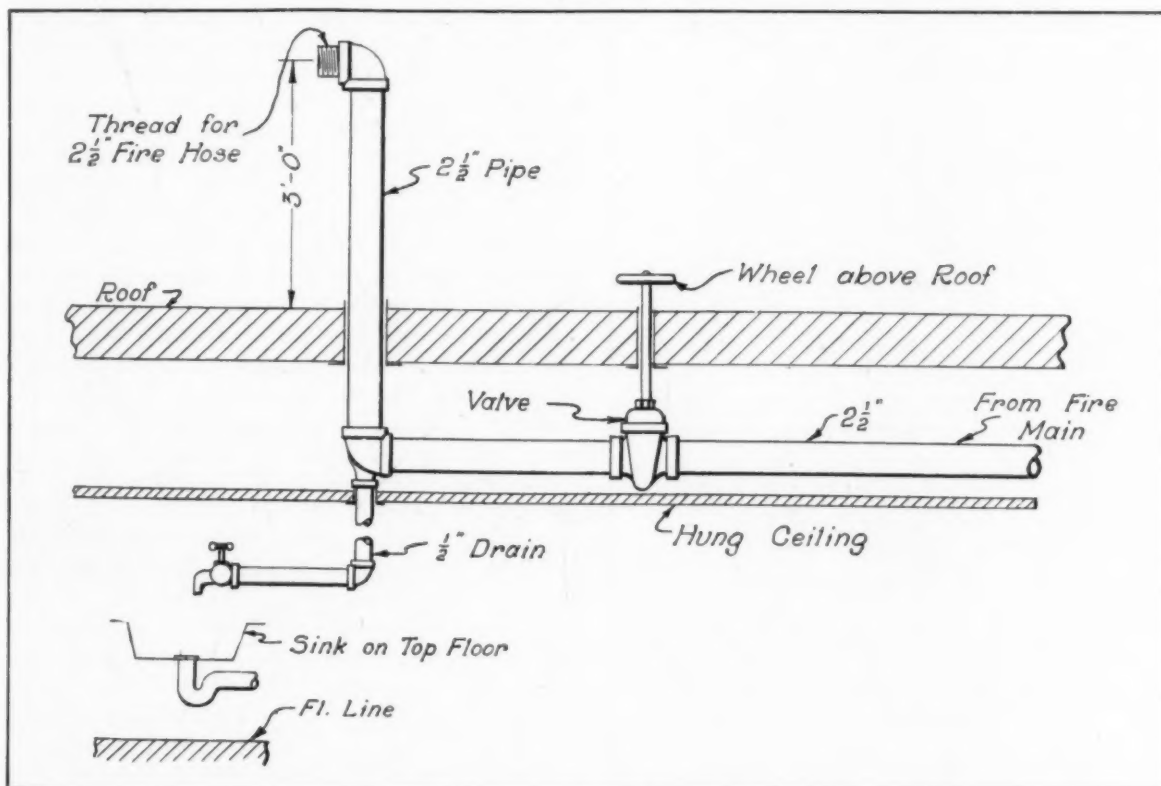


Fig. 1. Detail of Typical Roof Outlet, Valve and Drain

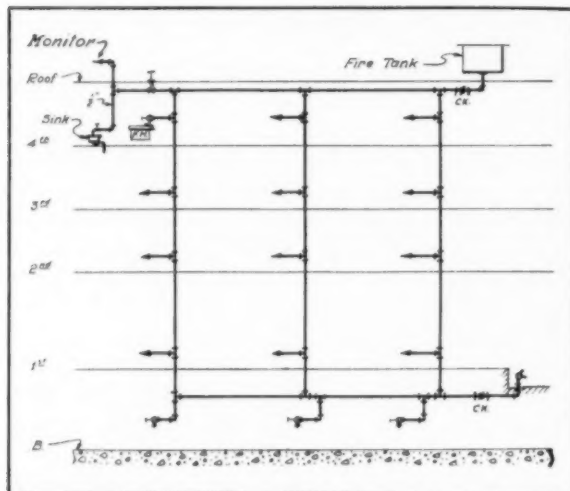


Fig. 2. Layout of a Typical Standpipe System

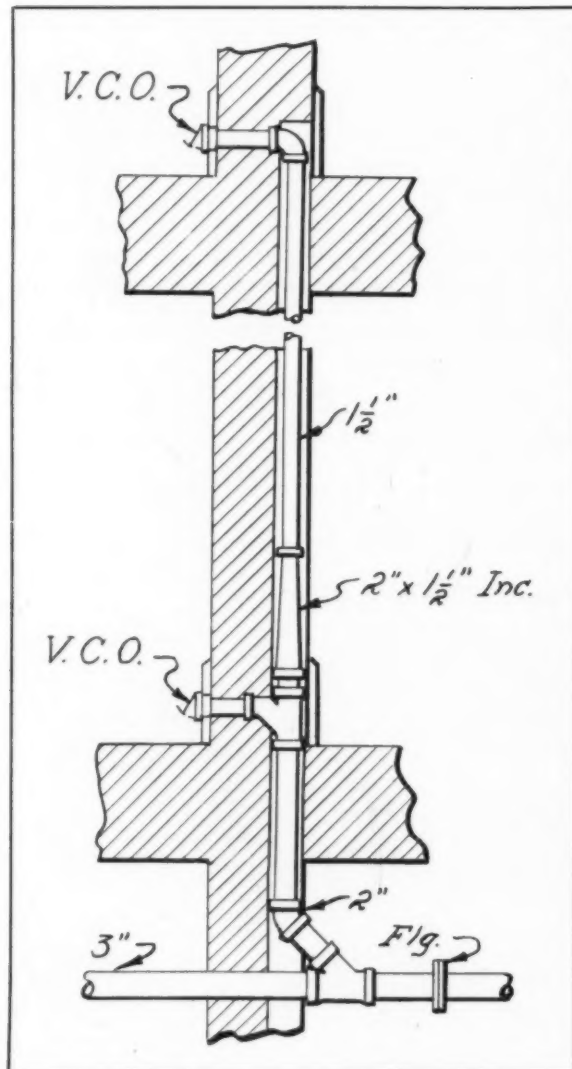


Fig. 4. Connections for a Typical Central System Vacuum Cleaning Installation.

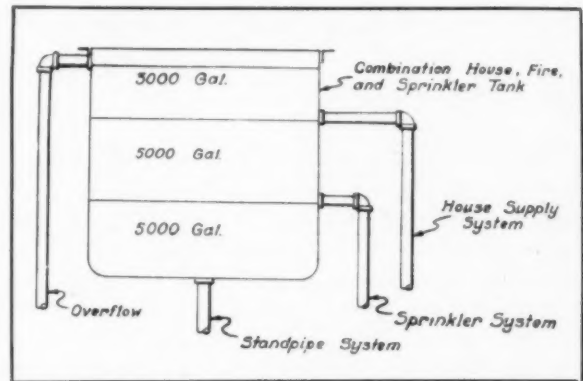


Fig. 3. Combination House Tank Connections

the stream from the nozzle on does not possess this desirable feature. The law or building code usually sets minimum requirements in regard to the standpipe provisions.

In order to provide an emergency supply of water for the use of the hose by the occupants, a connection to the street main or to the house tank or both is made from the standpipes, and, where the top of the building is above the height of effective city pressure, the house tank connection must be made; only in this case the house tank is either a separate fire tank for fire use only, or else it is combined with the house tank so as to reserve a certain amount of water for standpipe service, this amount usually being between 3,000 and 5,000 gallons. When a separate fire tank is used, it is filled either by city pressure or by pumping, and it has a bottom connection which is run into a horizontal main which connects into the tops of all the standpipes, with a check valve close to the tank, the use of which will be explained later. The street connection is made in a similar manner through a check, but to the bottoms of the standpipes. The object of this is to supply the hose as far up as the city pressure will reach in case the tank reserve should be exhausted.

For the use of the fire department a Siamese connection is installed at the sidewalk, having two 2½-inch connections and a 4-inch outlet to a 4-inch line which also connects through a 4-inch check valve to the bottom of the standpipe. The fire engines are coupled up to the Siamese, and the fire engine pressure is delivered direct into the standpipes. It is to prevent this pressure (which is higher than that of the fire tank and the city system) from backing up into the tank or out into the city mains that the checks on the house tank and city connection previously mentioned are used. Hose of regular 2½-inch size is then taken up into the building by the firemen and coupled to the standpipes at the floor levels where the fire is to be attacked. Owing to the fact that 2½-inch hose under high pressure requires expert

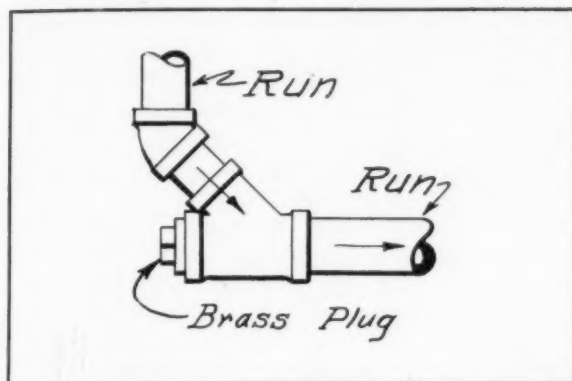


Fig. 5. Cleanout Plug Correctly Placed in Direction of Flow in Vacuum Cleaning Pipes

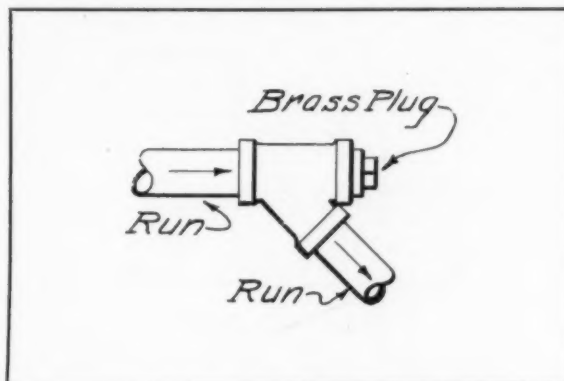


Fig. 6. Cleanout Incorrectly Placed Against Direction of Flow Causes Trouble

and trained manipulation, the hose in the building racks is made of $1\frac{1}{2}$ -inch size and as short as possible to facilitate handling by the occupants; but the firemen's hose is $2\frac{1}{2}$ inches, in order to get a larger stream on the fire and because the firemen know how to handle the larger size at the higher pressure.

It is often desirable to place "monitors" or hose outlets on the roof to be used against fires in adjacent buildings, the fire monitor being the most expensive. The hose outlet possesses the advantage of allowing a hose to be run to any point on the parapet, whereas the location of the fire monitor is fixed. Such roof outlets should be protected against freezing by having the valves installed inside of the building with wheel handles above the roof. Valved drains should also be installed on the outlet sides of the valves to drain out the pipes after use, as otherwise the water will stand in the pipes above the roof and be exposed to freezing.

In Fig. 1 is shown a detail of a typical roof outlet, valve and drain, while in Fig. 2 is a layout of a typical standpipe system. The riser sizes vary from 4-inch to 6-inch, according to building height and local requirements; a 4-inch standpipe will supply two $2\frac{1}{2}$ -inch hose, a 5-inch, four $2\frac{1}{2}$ -inch hose, and a 6-inch about six $2\frac{1}{2}$ -inch hose. It is seldom that standpipe lines exceed 6 inches in size. The fire tank connection and the street connection need not exceed the size of the largest riser. In some cases fire pumps are installed for standpipe lines, but this is not usual except for very large buildings; in some districts two Siamese connections are also required.

SPRINKLERS

Closely allied with the standpipe system are automatic sprinklers. These usually require fusible heads located on about 10-foot centers on the ceilings of all rooms to be protected. Basements, factories, dry kilns, packing rooms and other locations where fires are likely to have their origin

are desirable areas for sprinklers. It is not necessary to go into all the details of the various sprinkler installations, as these are governed by Underwriters' regulations which cover the subject fully. Separate Siamese connections will be required for the sprinkler system and separate reserve water, either in a sprinkler tank or in a combination tank, such as is shown in Fig. 3, where 3,000 gallons are for house use, 5,000 gallons for sprinkler use, and 5,000 gallons for standpipes. Sprinkler pumps are also required on certain installations, although the gravity tank is

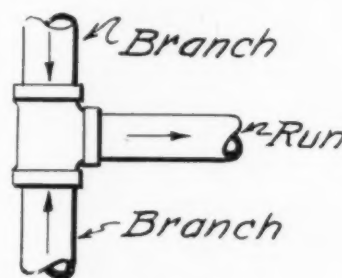


Fig. 7

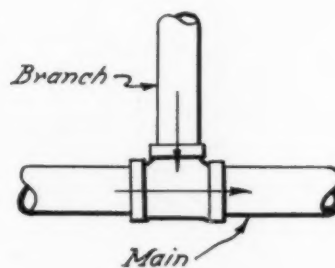


Fig. 8

Connections as shown in Figs. 7 and 8 are Easily Clogged and Should Not Be Used in the Vacuum System

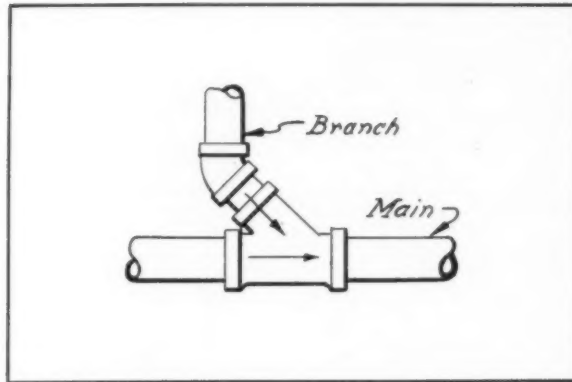


Fig. 9. Proper Connections between Horizontal Main and Branch

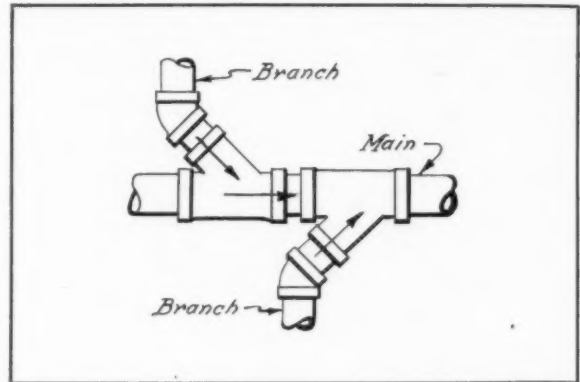


Fig. 10. Proper Connection between Main and Two Branches

regarded as the most dependable of all sources of water supply for fire protection and sprinkler use.

Piping for fire protection lines is most frequently made of galvanized steel pipe with galvanized, screwed, malleable pattern steam and water fittings. Where pressures of over 150 pounds are possible, extra heavy fittings should be used. Hose valves, hose racks and hose are often placed in hose cabinets set flush with the wall, not only to protect the hose but also for the sake of appearance. Where cabinets are used they should have manually-operated handle catches so that immediate access can be obtained by anyone at any time. A locked door and glass which requires breaking are likely to result in cutting the hose in getting it out of the cabinet. For locations where tampering is prevalent, a locked cabinet door with the key in a glassed-in box adjacent to the cabinet will be a better arrangement than a cabinet in which the glass in the cabinet itself must be broken to secure access to the hose.

VACUUM CLEANING

Vacuum cleaning may be effected by the central system in which all outlets are piped to a

vacuum cleaning machine in the basement, or by means of the portable type which is run around and plugged into electric outlets at convenient locations. The portable system is perhaps not as convenient as the pipe system, but it has the merit of being less expensive to install. With the piped system it is essential to have the vacuum cleaning outlets installed in locations not only convenient for access but also so placed that a 50-foot hose when run around the halls and through doorways, etc., will actually reach to the extreme portions to be cleaned. The most desirable type of vacuum cleaning inlet is the snap-flush type which finishes flush with the wall and automatically closes when the hose is removed. Vacuum cleaning inlets are customarily located in walls near the floor, but occasionally in theaters they will be located in the floor out from the walls to avoid unreasonable lengths of hose. The size of inlet is $1\frac{1}{4}$ inches, and the pipe and riser are never made less than $1\frac{1}{2}$ inches to avoid matches' clogging the line. The risers are usually carried downward, but they can be carried up a floor or two where conditions make this necessary.

The piping is nearly always of black steel, on

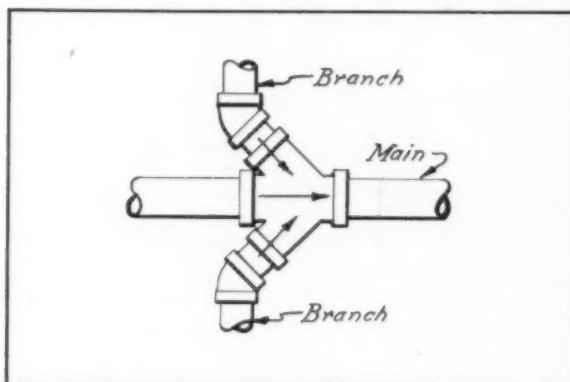


Fig. 11. Double "Y" Connections are more Subject to Stoppage than Connection Shown in Fig. 10

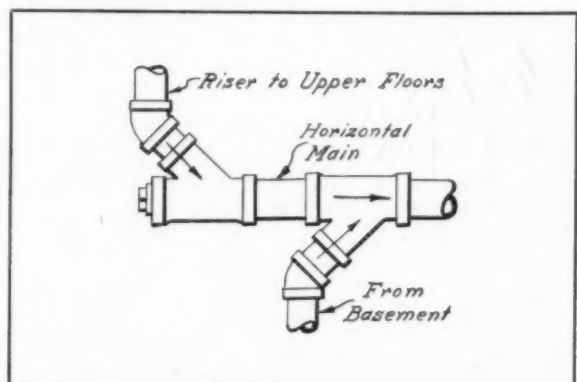


Fig. 12. Dirt from Riser Is Likely to Clog Pipe from Basement if Connections Are As Shown

account of cheapness, and of smooth interior bore, and the fittings should be black, cast-iron, long-radius, recessed drainage fittings. The sizes of the mains are determined by the maximum number of tools or sweepers for which the system is designed. The mains should not be unduly increased over the sizes actually required with the idea of securing a better pulling vacuum at the tool. This undoubtedly does result, but the oversized main also causes a large drop in velocity which tends to allow the air to slow down sufficiently to drop the dirt out of it, resulting in quickly stopping up the main. In a plant running from two to six sweepers' capacity, it is usual to consider $1\frac{1}{2}$ -inch risers sufficient; a 2-inch main is required for two sweepers, a $2\frac{1}{2}$ -inch main for four sweepers, and a 3-inch or $3\frac{1}{2}$ -inch main for a six-sweeper plant. In every case the main begins at $1\frac{1}{2}$ -inch size at the bottom of the first riser, is 2-inch after taking in the second riser, $2\frac{1}{2}$ -inch after taking in the third riser, and 3-inch after taking in the fourth riser, etc. As soon as the size of main is sufficient to carry all the sweepers for which the plant is designed, there is no object of any further increase in size. Fig. 4 shows typical risers for a two-story building and the method of connection to basement main.

Usually at frequent intervals brass screwed cleanout plugs are located. Where a horizontal line makes a 90 per cent turn, the cleanout should be arranged to clean in the direction of flow, as shown in Fig. 5, and not against the flow as indicated in Fig. 6. Use of such junctions as are shown in Fig. 7 and Fig. 8, employing a straight tee, is absolutely impossible, as they are easily clogged. The best way to bring one horizontal main into another is indicated in Fig. 9. If two branches are to be connected into a main at practically the same point, the branches should be connected one back of the other as shown in Fig. 10, and not into a double Y-branch as shown in Fig. 11, because dirt coming into one side of a double Y is likely to be thrown over into the opposite inlet and thus plug it. Outlets located in basement rooms and below the level of the main have to be connected to the overhead main in such a manner as to prevent the dirt from the upper floors falling into the pipe from the lower outlets; a connection such as is shown in Fig. 12 is bound to plug the basement pipe by the dirt stopping it, but if the basement pipe is brought into the horizontal main back of the upper floor connection, or if brought into the horizontal main from the side instead of from the bottom, this difficulty will be avoided. Flanges on horizontal mains at frequent points are useful on long runs to allow for cleaning.

In order to determine the number of sweepers which will be required for a given installation, 4,000 square feet of bare floor per sweeper per

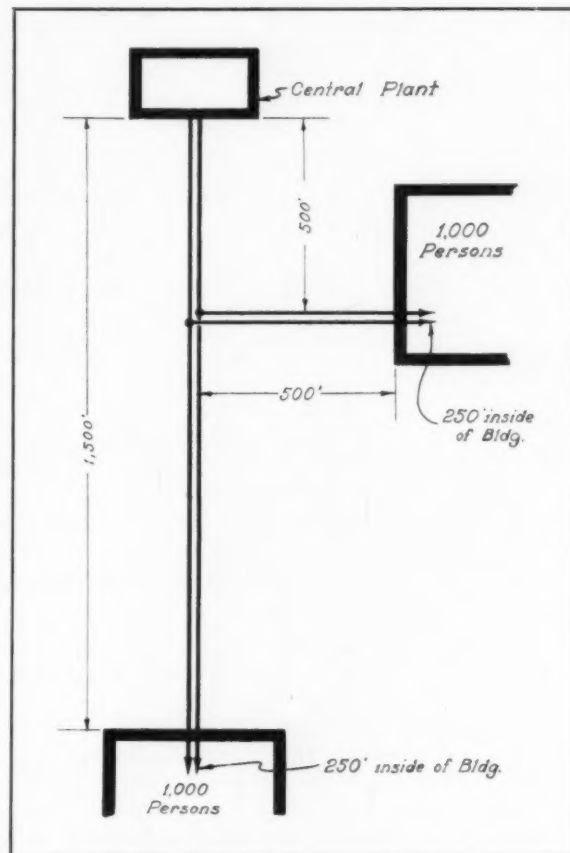


Fig. 13. In Providing Cooled Drinking Water from a Central Plant to the Other Buildings, Length of Run Is an Important Factor

hour may be assumed. Upholstery and carpets of course require much more time, and the probable type of floor covering as well as the number of hours when their operation will be permissible must be considered in estimating the capacity of sweepers. In schools, for instance, it is usual to assume $2\frac{1}{2}$ hours after school sessions for cleaning, and it is presumed that the average classroom can be cleaned in about 15 minutes. If the corridors and special rooms are cleaned during school sessions, this will work out to one sweeper for every eight classrooms or fractions thereof.

DRINKING WATER SYSTEMS

Drinking water systems are of two kinds,—one in which only a few fountains are required, such as in a main hall or in the back of a theater, and the other in which outlets are required in a number of locations, as in each office of an office building or in each room of a hotel. In the small installation, a combination unit electrically operated may be obtained and a small circulation pump provided to rotate the water through the circuit (Fig. 14). In the larger systems real refrigeration, running from 3 to 10 tons' capacity, must be provided. Both large and small systems cool the

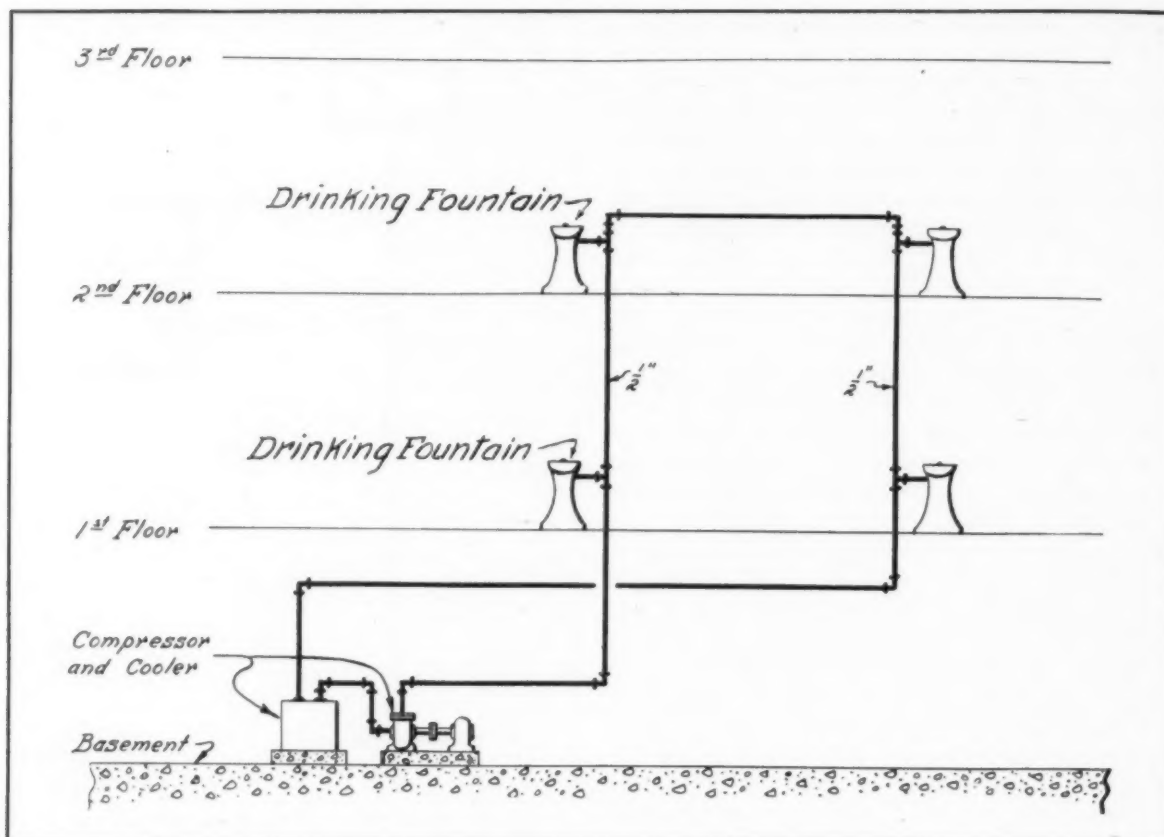


Fig. 14. A Small Drinking Water System with Circulation Pump

water at a central point and then circulate it through drinking water supply and return mains so as to include all fountain outlets in the circuit.

The calculations for a drinking water system are more or less complicated by the matter of so much of the load's consisting of heat absorption by the pipe lines and so little being involved in the actual water furnished. In estimating for a large drinking water system the length of run is a more important item than the exact amount of water which will be required. Consequently, every effort should be made to keep the pipe lines as short as possible and as small as possible, the size being consistent with the amount of circulating head allowable on the circulating pump. Half a gallon per day is allowed per person for drinking and wastage, as this is fairly close to averages obtained in actual installations. The ideal drinking water temperature is about 50° Fahr. Refrigeration is reckoned in tons per day of 24 hours, each ton being equal to about 200 B.t.u. per minute. In order to determine the quantity of water which it is necessary to circulate, it is necessary to know the allowable rise in water temperature permissible while traveling around the circuit and the amount of heat absorption by the circuit. The heat absorption is determined by the pipe size, and the

pipe size is determined by the circulation which it is desired to calculate. From this it will be seen that the whole matter travels in a circle, and that in order to break the circle, certain arbitrary factors must initially be assumed, only to be corrected later if the results indicate that they are incorrect.

These factors may be settled upon at once as a basis for calculation:

- (a) The average water temperature in the system is to be 50° Fahr.
- (b) The maximum temperature in the building will not exceed 100° Fahr.
- (c) The efficiency of the drinking water covering will approximate 80 per cent.
- (d) The circulation head allowable on the drinking water pump should not exceed 25 feet (or 10.8 pounds per square inch).

The next assumptions are only tentative and will require modification when more figures have been worked out.

- (1) That the average size of line for the system is 1½ inch.
- (2) That the variation in water temperature shall not exceed 10° Fahr. across the ends of the mains in the central plant.

THE SUPERVISION OF CONSTRUCTION OPERATIONS

BY

WILFRED W. BEACH

THE DUTIES OF SUPERINTENDENTS—(Continued)

Editor's Note. This second part of Mr. Beach's series continues Chapter 2 which appeared in the January issue of THE ARCHITECTURAL FORUM.

17. *Job Program.* At the beginning of a given work, the Chief Construction Engineer will confer with the contractors and agree with them upon a job program and time schedule, from which will be determined the time for ordering all materials, dates when they should be in readiness, and the degree of advancement of the whole work at each fortnightly interval. It shall thereafter be the duty of the Superintendent to bend every effort toward seeing that each contractor and foreman is doing his best to live up to this program and is looking ahead and planning accordingly. If not, he should be required to show cause. The Home Office demands specific information on such matters.

18. *Changes.* No employe of this office will be excused for suggesting a change to an Owner or Contractor. Any advice or criticism is to be made to the Chief or to the Home Office direct. It will be welcomed as part of the whole-hearted service each employe is expected to render; but the Home Office will take care of all such business dealings with both Owner and Contractor. The Superintendent must notify the Home Office immediately in event of any expression of dissatisfaction on the part of the Owner and shall not allow the portion of the work involved to proceed until a permanent or temporary settlement of the point has been made.

The Home Office will prepare an "Extra Work Order" and send a copy to the Contractor and one to the job office, covering each piece of extra work added to the original contract. Such orders will bear consecutive numbering and will show in detail the specific sort of work to be done and the basis of payment for it (percentage rate, if cost-plus; or stipulated amount, if lump-sum). Similar order will be issued covering each deduction. For all cost-plus work, whether for specific extras, for cleaning premises, plaster patching, glass replacement, or for any other work for which a Contractor expects to collect in addition to his contract price, the Superintendent must keep a daily record and check it each day with that of the Contractor, as the only method by which an authentic accounting can afterwards be made.

19. *Tests.* The Superintendent must post himself regarding all tests called for; know when they are to be made and be sure to witness them.

Later, he must secure and forward to the Home Office all records, exactly as specified. He should look ahead and be in a position to recommend tests where they appear necessary, in addition to those specifically called for. In this connection, he should have an early understanding with his Chief regarding tests of the bearing capacity of the soil, if any are indicated, and arrange for them accordingly.

20. *Coöperation.* One of the most important duties of a man assigned to watch construction is to actively assist in coördinating the various branches of field work so that all crafts will work together harmoniously. Matters of working space, storage space for materials and questions of job procedure are all up to the Superintendent to take care of before the occurrence of misunderstandings or conflicts.

21. *Expediting.* It is a distinct duty of a man supervising construction to follow up all work promptly upon his assignment to a job, and continuously thereafter. This means knowing at all times the state of progress of shop drawings, fabrication and manufacture of all various materials, such as cut stone, terra cotta, structural steel and iron, millwork, etc. It is dead wrong to assume that these matters take care of themselves in due time, but it is the particular duty of a Superintendent to keep himself informed as to the exact status of every subject pertaining to his job.

22. *In General.* The Appointee will be held responsible to the Home Office for all details in the conduct of the work to completion, or will have to be convincing in otherwise fixing such responsibility. The loyalty of the Home Office to the Owner is its first consideration, but the success of our operations depends greatly upon the loyalty of our employes to the Home Office and to the job. Therefore,

Don't gossip about the work.

Don't be undignified in either your language or your deportment.

Don't get chummy with men on the job or with their employers.

Don't accept favors from contractors, subcontractors, material dealers or employes, large or small.

Don't be unfair. You'll lose your point.

Don't lose your temper. Simulate righteous wrath, if advisable, but do so deliberately and remain in command of yourself and the situation.

Keep your head up and your mind clear.

expense of the job and its Owner. It is much better to provide the stranger with a set of instructions and a scratch pad and give him at least a day in the office. He can then be adjudged in a preliminary way, at the expense of his new employer, by his notes, comments and questions; and the manager or Architect has saved himself a lot of oral explanations of his office practice. Written instructions cause fewer misunderstandings.

SUPERINTENDENT'S RECORDS

nearly complete and invulnerable as he can find means to make it. Some too-clever sharpshooter will find the victim's unprotected heel in any event. It is peculiarly characteristic of human kind that anything derogatory to a person's reputation will be broadcasted far more rapidly than will something especially creditable. An architect intent upon making a name for himself as a high class designer may be surprised to discover that he is better known as a slipshod performer. Due warning of this should be impressed upon every construction superintendent.

It is well also for the superintendent to bear in mind that there are several reasons for his employment. Watching the work is but one of these. If the contractors are honest and none is losing money on his contract, the work of inspection may be the least arduous of a superintendent's duties. It is to be regretted that the natural inference to be drawn from the fact that a superintendent has been detailed to oversee a particular operation is

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Fig. 1. Superintendent's Daily Report. The Original is 8½ x 11 inches

Fig. 1. Superintendent's Daily Report. The Original is 8½ x 11 inches

that contractors are likely to cheat, when, if and as opportunity offers. This assumption should be amended by saying that contractors are merely average humans, some honest and some otherwise. It is the business of a superintendent of building construction to ascertain which type of man the owner is dealing with, and to function accordingly.

There is no doubt but that the system of competitive bidding contracting generally in vogue in architects' offices throughout the land offers peculiar temptations to individuals who rely upon their cleverness in evading, substituting and covering up. Such swindlers deliberately allot portions of their work to others at figures which induce similar crookedness on the part of their subcontractors. In order to avoid such abuse of the owner's trust, the wise architect will use his best efforts to prevent the awarding of contracts to concerns other than those of known integrity. This custom results ultimately in the compilation of lists of general and trade contractors acceptable in such an office, made up of those who are known to refrain from dishonest practices.

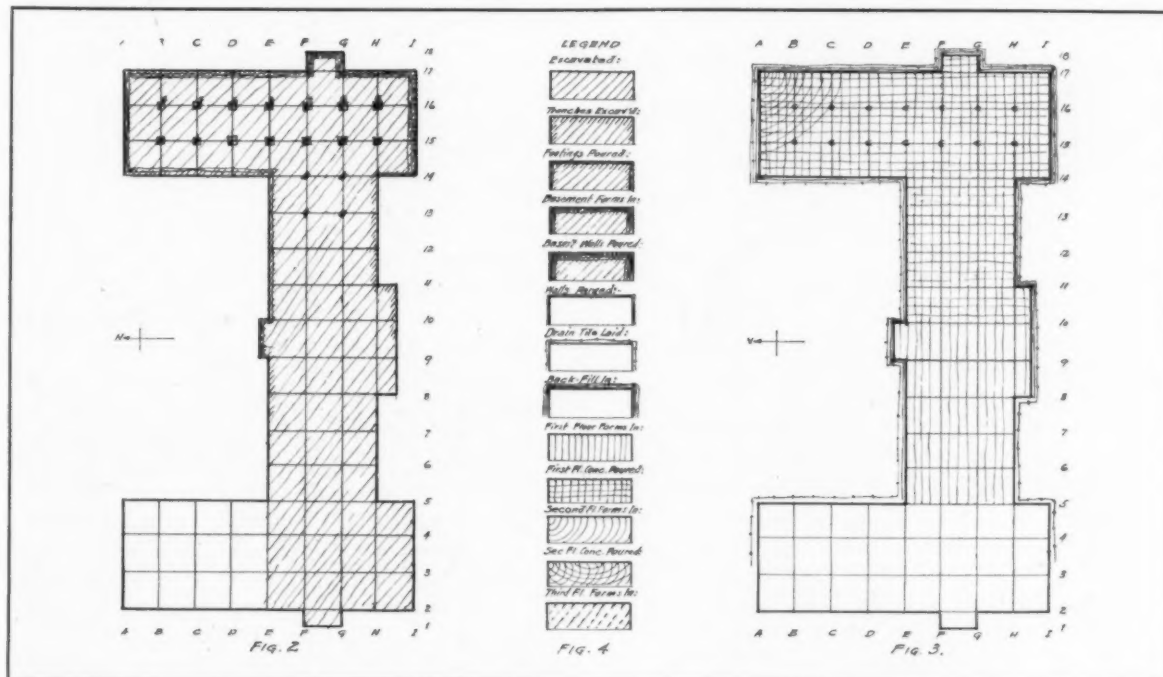
Supervision of the work of these concerns resolves itself mainly into a matter of assisting in interpreting contract documents and generally expediting the work. To be sure, a penurious owner will seek to defeat this by insisting upon the retention of the low bidder, regardless of the latter's reputation, claiming the privilege of reliance upon the contractor's bond and the architect's supervision to secure his money's worth. The mistaken economy of such procedure is easily demonstra-

ble. It is much safer for an owner to entrust his work to a reputable contractor without a bond than to commit it to an individual with a shady reputation who is apparently protected by a bond. But, even under those contractors intent upon honorably carrying out their obligations, one must be always alert in detecting mistakes or willful wrong doing of workmen and subcontractors.

An example of this is seen in the performance of those concrete foremen and laborers who persist in "saving" cement whenever the inspector's back is turned, even when their employer has given no such instructions. One such workman, in his misguided zeal for his employer's interest, was seen to be using heaping shovels in measuring sand and gravel, but not more than one-fourth as much in each shovel in doling out the cement. Similar defections must be guarded against in other trades. The author will call attention to these as the reader is conducted successively in these articles through the various trade operations as the work progresses; but there can be no such thing as a complete category of contractors' and laborers' shortcomings. These are likely to crop out when least expected and the necessity for their prompt detection keeps a superintendent constantly alive and vigilant in the exercise of his duties.

The supervisory duties of an architect (he being best termed the "supervisor" and his representative the "superintendent") are well expressed in his contract with the owner, thus:

"The Architect's supervision shall include assistance to the Owner in:



Figs. 2, 3 and 4. Methods of Recording Construction Progress as Explained on Page 300

Record should be made of all phone calls. All Long Distance calls must be recorded in triplicate, one to other party, one to home office, one on job. All unrecorded calls must be paid for by persons making calls.	JOHN SMITH JONES ARCHITECT MILLVILLE, P. M. TELEPHONE RECORD AND CONFIRMATION	JOB No. _____ OWNER: _____ LOCATION: _____ DATE: _____												
<table style="width: 100%;"> <tr> <td style="width: 30%;">TALKED TO _____</td> <td style="width: 10%;">OF _____</td> <td style="width: 30%;">TO-DAY, AT _____</td> <td style="width: 10%; text-align: right;">A. M. P. M.</td> </tr> <tr> <td colspan="4" style="padding-top: 10px;"> ABOUT _____ </td> </tr> <tr> <td colspan="4" style="padding-top: 10px;"> MY UNDERSTANDING OF CONVERSATION IS THAT _____ </td> </tr> </table>			TALKED TO _____	OF _____	TO-DAY, AT _____	A. M. P. M.	ABOUT _____				MY UNDERSTANDING OF CONVERSATION IS THAT _____			
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<table style="width: 100%;"> <tr> <td style="width: 25%;">TOLL IS \$ _____</td> <td style="width: 25%;">PAID TO BE BILLED _____</td> <td style="width: 25%;">CHARGE TO _____</td> <td style="width: 25%;">SIGNED _____</td> </tr> </table>			TOLL IS \$ _____	PAID TO BE BILLED _____	CHARGE TO _____	SIGNED _____								
TOLL IS \$ _____	PAID TO BE BILLED _____	CHARGE TO _____	SIGNED _____											

Fig. 5. Telephone Record and Confirmation Blank. Original 8½ x 5½ inches

1. Maintaining an effective working organization of the contractors employed on the structure.
2. Instructing them as to their work.
3. Passing upon the merits of materials and workmanship.
4. Demanding correction and remedy of all discovered defects.
5. Keeping accurate records of all conditions pertaining to the work.
6. Computing partial payments due contractors and issuing certificates for them.
7. Auditing payments to subcontractors and material supply concerns to prevent the filing of mechanics' liens."

For the duties involved in item 5, the superintendent is supplied with certain forms and is instructed as to their use. Principal of these is the "Daily Report" report blank, a specimen of which is shown in Fig. 1. If these blanks are especially printed for a given job, it is well to have an outline diagram of the building plan printed on the back, occupying about half the page, leaving the remainder for notes and correspondence. If a diagram is not so printed, a rubber stamp can be cheaply made and used for the purpose. This should include a number of small rectangles in which the symbols used can be indicated. The importance of filling in every item every day (or at other stipulated intervals) cannot be too thoroughly impressed upon the superintendent. He

must keep the home office posted fully and faithfully. It may take a half hour or longer to fill out a report after a busy day, but his time cannot be more valuably employed. His records may be the means of settling more than one controversy and of saving the owner much time and expense,—and of relieving the architect of much worry. Figs. 2, 3 and 4 illustrate methods of recording construction progress. This is merely a matter of compiling a "legend" or series of symbols and proceeding accordingly. The use of colored pencils for the purpose will afford much greater flexibility and legibility than is indicated in these examples. When a superintendent is required to stipulate at regular intervals just what percentage of each contract or trade is completed (or its degree of progress), these daily diagrams will materially aid in computing such percentages.

It can readily be seen, from inspection of the diagram in Fig. 2, that, at the time it was filled in, the general excavating was complete, except the north end of west wing; more than half of the outside wall trenches had been dug, also about one third of those for the column footings; outside wall footings of each wing and half of those under north wall had been poured, also the footings under 14 columns of the east wing; forms had been erected for outside basement walls of the east wing and concrete poured therein; and basement steel had been erected along column line 16. Diagram of Fig. 3 shows first floor forms all in

<div style="border: 1px solid black; height: 40px; margin-bottom: 5px;"></div>	JOHN SMITH JONES ARCHITECT MILLVILLE, P. M. CERTIFICATE FOR PAYMENT	JOB NO. _____ CERTIFICATE NO. _____ DATE _____								
To This certifies that Contractor for For your at entitled to Payment on account under his contract to the amount of Dollars (\$ _____)										
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td>Contract Price</td></tr> <tr><td>Extras</td></tr> <tr><td>Deductions</td></tr> <tr><td>Total Contract</td></tr> <tr><td>Previously Allowed</td></tr> <tr><td>This Certificate</td></tr> <tr><td>Allowed to Date</td></tr> <tr><td>Balance</td></tr> </table>	Contract Price	Extras	Deductions	Total Contract	Previously Allowed	This Certificate	Allowed to Date	Balance	<div style="text-align: right; margin-bottom: 20px;">Architect</div> <div style="border: 1px solid black; height: 100px; margin-bottom: 10px;"></div> <div style="text-align: center;">Received the amount of above certificate.</div> <div style="text-align: right;">19 _____</div>	
Contract Price										
Extras										
Deductions										
Total Contract										
Previously Allowed										
This Certificate										
Allowed to Date										
Balance										

Fig. 6. Certificate for Payment. Original 8½ x 5½ inches

place, except in west wing, and concrete in them extending almost to center line of building; columns erected along lines 15 and 16, and second floor form work started in northeast corner; basement walls stripped and parged, except west wing and adjoining portion of front wall; drain tile laid along outside of footings, except for a portion of west wing; and back filling well under way around east wing. It is easy, of course, to try to record too much, thus rendering the diagrams too intricate to be readily filled in and too involved to be quickly comprehended. Again, one should be sure than common sense is standing by him. "One's system should be ever the servant, never the master." If an architect be superintending his own work, he will find it to his advantage to keep job records as faithfully as if he were reporting to someone else. It is the surest way to avoid falling into slipshod habits.

Another preventive against carelessness is the habit of recording telephone conversations immediately after the receiver is returned to the hook. This habit can be more readily formed if special blanks for the purpose, with carbon sheets in place, are kept handy. Fig. 5 is a specimen of such a blank. Fig. 6 is the certificate for monthly payments. This is of ordinary form, except that more space than usual is allowed for the record of accounts with the contractor. These certificates may be made out by either the architect or his superintendent, but are customarily signed by the architect personally. Contractors have been known

to make a practice of depositing them to their bank accounts, the same as checks, and the importance of care and exactness in their preparation cannot be over-rated.

The bookkeeping upon which the issuance of certificates is based need not be complicated if a proper record book (preferably loose-leaf) is used. The pages should be ruled for eight columns of figures, preceded by four columns for explanatory matter to accommodate these entries:

Column

1. Date of contract.
2. Name of contractor.
3. Kind of contract.
4. Number of certificate or change order.
5. Amount of contract.
6. Amount of extra.
7. Amount of deduction.
8. Total net changes, plus or minus.
9. Total net contract.
10. Amount of partial payment.
11. Total payments to date.
12. Amount of unpaid balance.

Thus each entry is a complete record to date of the particular contract recorded, and there should be no question of anything failing to balance later on. On small jobs, a single page can be used, each line consecutively, for all contracts, and all entries made chronologically. On larger work, each major

contract should be allotted a separate page. On work remote from the home office, a duplicate of these accounts should be part of the superintendent's file at the job and should be frequently checked with the home office record.

The method of computing the amounts of monthly payments is more strictly a matter of office procedure than it is a duty of the superintendent, though he is often called upon to perform the service. For this, reference is had to a copy of the detailed estimate of job costs which should be part of the file records, whether compiled by the contractor or in the architect's office. In the former case, the figures should be carefully reviewed and checked by the architect. An instance can be cited where a contractor added a considerable amount to such items as excavating and foundations, and correspondingly reduced such items as painting and glazing, which are among the things last completed. As a result, when he confessed insolvency at the time the work was half finished, it was found that, instead of receiving 85 per cent of the value of material and labor as the work progressed, he had actually collected about 110 per cent. In view of such a possibility, it is well, when a contract is about two-thirds or three-fourths fulfilled, to estimate the value of work still to be done, rather than what has been done, and to compile the remaining certificates accordingly. One is wise, too, to have the article on par-

tial payments in the contract read that they shall be based, not "on the actual value of labor and material incorporated in the work" (or "delivered on the premises," as the case may be) but on "the architect's estimate" of such value. This renders the protests of a grasping contractor of no avail against an architect's firm convictions.

If payments are to include amounts sufficient to cover unused materials on the premises, the superintendent is then charged with observing that there is no undue surplus of any material delivered and that none for which allowance has been made is hauled away. On work of moderate size, all such difficulties can be avoided by arranging to have payments fall due in five (or other suitable number) equal installments, at such times as "when first floor framing is in place," "when roof is on," etc.; the final payment being due 30 or 35 days after the work is accepted.

Whoever is charged with this task of issuing certificates should have sufficient knowledge of the working of the mechanics' lien laws in the state in which the work is located to prevent any liens being filed. Where contractors are accustomed to file waivers of liens from subcontractors and material men or to submit sworn statements that all material and labor are paid for, they do so without demur. In any case, the architect must see that the owner's interest in this respect is fully safeguarded. It is one of his important obligations.

CHAPTER 4

THE FIRST DAY ON THE JOB

WHETHER one be a green novice setting forth to act as clerk-of-the-works or inspector on his first assignment or if he be a seasoned superintendent, to whom the passing from job to job is an old story, there is always something akin to the spirit of adventure in the approach to the beginning of a work of construction. Regardless of what may have happened on other operations, some features of this are bound to be different. New situations are forever arising, new emergencies to be met, fresh experience to be gained.

The appointment of a superintendent is made about the time contracts are awarded, and he at once confers with the architect (or construction manager) on all the various details pertaining to the conduct of the work. A time schedule has been arranged with the principal contractors, general, heating, plumbing and electrical. The general contractor has submitted a list of his "subs," which is given to the superintendent with instructions to look up those residing in the city where the building is to be erected. He is also

given a complete set of contract documents and a copy of "Instructions to Superintendents" and is told to spend a day or two in the office acquainting himself with it and with the file records before presenting himself at the building site. He makes note of such items as are left to the judgment of the architect for decision and either discusses them with him or marks the items for future reference. A superintendent knows that a specification frequently stipulates that the decision of the architect will govern this or that, when it is actually expected that the ruling will be made by the man on the job, whether he be the architect himself or his representative. In this respect, as in all others, the superintendent should have a very definite understanding as to just how much authority and responsibility are to be vested in him.

He should also be most particular to "iron out" all changes and addenda which have been incorporated in the contract by virtue of the acceptance of alternates or the issue of change orders. The ramifications of some of these may extend

throughout the entire construction, and it makes much smoother going for the superintendent to be set right at the start, and at the home office on everything that appears the least bit hazy, rather than to bother with such uncertainties at the job, where there are plenty of other duties to absorb his attention. For the same reason, he will be as meticulous as time will permit in reviewing drawings and specifications before departing for the scene of action, knowing that the requisite checking and cross-checking are too likely to be neglected, if postponed.

In going through the specifications, he notes particularly those clauses which apply particularly to the initiation of the work, inasmuch as he should be familiar with these at the time of his arrival. Some of the clauses in the General Conditions published by the American Institute of Architects he finds to be only partially applicable to his particular work. For instance, in "Art. 12. Protection of Work and Property," he reads, "He (the Contractor) shall adequately protect adjacent property as provided by law and the Contract Documents." This school site (being considered here) is so isolated as to render it unlikely that the building operations will in any way threaten damage to property adjoining. If, however, the contractor's work should happen to be in a busy section of the city, this protection clause is most pertinent. State laws vary somewhat as to whose is the responsibility for party line construction operations carried on immediately adjacent to existing structures. If, as in Illinois, the law provides that the adjoining property owner must, on due notice, take necessary steps to protect himself against possible damage, then it is up to the architect to see that proper legal notice is duly served before construction begins. It thereafter is the business of architect, superintendent and all others concerned to closely cooperate to the end that all indicated precautions are observed to properly safeguard the interests of all parties. If shoring is needed, it is within the province of the contractor to see to it that such protection is adequate and to cooperate with the party employed to look after the interests of the adjoining owner. This specification clause governs:

"The Contractor shall provide all permanent and temporary shoring, anchoring and bracing reasonably required by the nature of his work, in order to make all parts absolutely stable and rigid, even where such shoring, anchoring and bracing are not explicitly called for. He will be held strictly accountable for any damage resulting from failure to provide it, either through lack of proper judgment or from any other cause."

In this, as in other cases where the contractor is supposed to use his own best judgment and has,

by contract, accepted responsibility for so doing, the superintendent must be exceedingly careful not to unduly stress his own ideas, whether he be in agreement with those of the contractor or at odds with them. It is general practice to hold the contractor liable in all matters pertaining to the adequacy and working capacity of the temporary facilities, as well as that of his equipment. Therefore, although it is the plain duty of the superintendent to warn the contractor of anything deemed insufficient, defective or otherwise improper, the character of the warning should be such as not to, in any degree whatever, imply that either the superintendent or his employers have any hand in the corrections or improvements adopted. This does not mean that either the superintendent or the architect is improperly evading in any way. The line of demarcation between their responsibilities and those of the contractors is, or should be, plainly drawn, and there is no need of either's encroaching on the other.

An example of the trouble that may result from a superintendent's carelessness in this regard occurred on a certain building where a contractor's men had secured a derrick guy-wire to a growing tree. Fearing that the tree might suffer damage, because of its small size, the superintendent suggested a better anchorage for the guy. The foreman thereupon had the wire removed and attached to the floor construction of a well filled cement shed. The superintendent, in an unguarded moment, gave assent to the change, but neither he nor the foreman noticed when the quantity of cement in the shed was too greatly reduced and an unusually heavy load on the derrick wrecked the shed and caused considerable damage to the work under construction. The contractor claimed cause of action against the owner on the ground that the latter's agent had compelled the foreman to change a safe anchorage to an anchorage which was dangerous.

Arrived at the site of the new school building on a certain Monday morning in April, two days ahead of the scheduled time for beginning the work, our superintendent found the excavating contractor already on hand, with several men and teams operating slip scrapers, and a steam shovel working its way into position. The superintendent had been charged by the architect to receive the general contractor's bond and send it in for approval, also to secure the name of his liability insurance company and the number of his policy. He found the contractor directing some carpenters as to locating temporary buildings and was promptly given both the bond and the information as to liability insurance policy. It may be assumed that the matter of acceptance of a contractor's bond is strictly an office transaction with which the superintendent has nothing to do. But, inasmuch as the contractor is technically

trespassing on the property until acceptance of his bond has validated his contract, it is incumbent upon the superintendent to bear this in mind and act accordingly. The details of this incident are therefore given as being typical of cases of the kind.

The bond was found to be the regular printed form of a surety company, properly licensed to do business in the state, instead of being on the form supplied by the architect, of which the superintendent had a copy, and duplicates of which had been sent the contractor. The contractor, in defense of his occupancy of the premises before formal approval of the bond, said that he was told by the agent (who happened to be a member of the board of education) that he knew the bond would be acceptable and that it would be all right for him to take every possible advantage of the good weather; but the contractor could not explain why the architect's form of bond (which was that of the Illinois Society of Architects) had been ignored. Inasmuch as it was evident that both the board member and the contractor had exceeded their authority, it was evident that a situation had developed right at the start that demanded careful handling. If the superintendent stopped the work and ordered the men and equipment off the premises, he would only be making trouble and creating antagonism that would not easily wear off. Later, if charged with improper delays, the contractor might allege in defense that there was a lack of cooperation from the very beginning of the work. The superintendent chose the better plan by suggesting that they call together on the agent, it being understood between themselves that, pending approval of a bond, the contractor was trespassing and subject to ouster.

Before leaving the site, the superintendent directed the contractor to box certain trees and mark for removal certain others that were too close to the building site. He also called attention to the damage already done to walks and curbs by driving over them, and he suggested the locations of four driveways with protection of walks and curbs as specified, citing the specification paragraphs on these subjects:

"BOXING TREES. All trees and shrubbery endangered by operations under this contract shall be carefully and adequately boxed with substantial planking."

"ALL WALKS, CURBS AND FENCES that are to remain shall be adequately protected wherever liable to damage. If driveways across side-walks (other than those indicated) are used, such walks and adjoining curbs shall be protected by 2" planking and 6" of tamped earth. No driving over unprotected walks will be permitted."

The contractor agreed to give these subjects proper attention and added that he would have a

foreman and additional carpenters on the job in the afternoon and get the building staked out.

The agent was in and appeared surprised that there should be any question as to the form of bond. He admitted having transmitted the architect's printed form to his company but supposed that his concern never issued a bond on other than its own form, of which he had handled many. He was so evidently inclined to make an issue of the subject that the superintendent suggested the advisability of calling a meeting of the building committee for discussion of the subject. This resulted in an evening session of the entire board at which the superintendent explained the difference between the two forms of bond and pointed out that the architect's form compelled the surety simply to carry out the terms of the contract, should the contractor fail to do so, whereas the form submitted contained several clauses making it incumbent upon the owner to do certain things to protect the surety company, which the owner might easily fail to do,—had no previous intention of doing. The agent continued to insist, contrary to the opinion of the superintendent, that his company would not change its form, which insistence induced the contractor to suggest the feasibility of his putting up a personal bond, signed by two local property holders of sufficient means. He also called attention to the fact that he had stated in his bid that he would deduct the price of a bond (\$10,500) if the surety should be waived, adding that his company was so well and favorably known that it was seldom asked for a bond, the cost of it being a sheer waste of good money. Asked for his views on the subject, the superintendent heartily endorsed the latter opinion and stated the attitude of the architect on the whole subject.

The objections to a personal bond are, first, that someone must accept the responsibility for approval as bondsmen,—men who are not officially registered as such, as are accredited surety companies; next, that, in case of default and suit against such bondsmen, they can readily enlist the sympathy of jurymen, in the character of innocent martyrs being sacrificed for their friend to the benefit of the community, the verdict resulting in some sort of a compromise, though the same jury would be quite ready to hold an outside corporation for the full amount of the loss, a good part of which would be considered as covered by the original premium. Further, the endorsers of a personal bond are necessarily persons of good standing in their community, men whose good will one does not care to jeopardize by forcing them to incur heavy financial loss in case the worst should happen.

*(To be continued in the April, 1929 issue of
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